Grid Director 4200

Installation Manual

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Preface

About this Manual

This manual provides installation instructions for the high-bandwidth, low-latency scalable Mellanox Grid Director 4200 40Gbps InfiniBand switch. It includes product specifications, unpacking and installation information, unit power up, and initiation and troubleshooting procedures.

Refer to the official and latest product release notes for last-minute updates.

Technical support may be obtained directly from:

- Your regional distributor from whom this product was ordered
- Your OEM customer representative

For further information and assistance, go to http://www.mellanox.com/content/pages.php?pg=support_index.

Audience

This manual is for system administrators responsible for installing the Grid Director 4200. We assume that you are familiar with the concepts and terminology of InfiniBand, Ethernet, and local area networking.

Related Documentation

For additional information, refer to the following documents:

- Grid Director Family Getting Started Guide [LIT-00037]
- Grid Director Family User Manual [DOC-00785]
- Grid Director Family Release Notes [DOC-00962]
- Regulatory and Compliance Reference Guide [DOC-00859]

Document Conventions

The following lists conventions used in this document.

NOTE: Identifies important information that contains helpful suggestions.

CAUTION: Alerts you to the risk of personal injury, system damage, or loss of data.

WARNING: Warns you that failure to take or avoid a specific action might result in personal injury or a malfunction of the hardware or software. Be aware of the hazards involved with electrical circuitry and be familiar with standard practices for preventing accidents before you work on any equipment.

Typography

The following table describes typographical conventions in Mellanox documentation. All terms refer to isolated terms within body text or regular table text unless otherwise mentioned in the Notes column.

Term, Construct, Text Block	Example	Notes
File name, pathname	*/opt/ufm/conf/gv.cfg*	
Console session (code)	`-> flashClear <CR>`	Complete sample line or block. Comprises both input and output. The code can also be shaded.
Linux shell prompt	`#`	The "#"character stands for the Linux shell prompt.
Mellanox CLI Guest Mode	`Switch >`	Mellanox CLI Guest Mode.
Mellanox CLI admin mode	`Switch #`	Mellanox CLI admin mode
String	`< > or []`	Strings in < > or [ ] are descriptions of what will actually be shown on the screen, for example, the contents of <your ip> could be 192.168.1.1
Management GUI label, item name	**New Network,** **New Environment**	Management GUI labels and item names appear in bold, whether or not the name is explicitly displayed (for example, buttons and icons).
User text entered into Manager, e.g., to assign as the name of a logical object	**"Env1", "Network1"**	Note the quotes. The text entered does not include the quotes.

1 Introduction

1.1 Mellanox Grid Director 4200 Overview

The Mellanox Grid Director 4200 is a high performance, ultra low latency InfiniBand switch for high performance clusters. With configurations of up to 162 ports of 40 Gbps per port InfiniBand connectivity, the 4200 delivers 11.52 Tbps of bandwidth with between 100 and 300 nanoseconds of port-to-port latency.

As a result, I/O bottlenecks are removed, allowing applications to operate at maximum efficiency. As a mid-size QDR switching solution, the efficient Grid Director 4200's smart design provides unprecedented levels of performance.

Figure 1: Grid Director 4200 – Front

Figure 2: Grid Director 4200 – Rear

1.2 Main Features

- Ultra-low latency: between 100 and 300 nanoseconds port-to-port
- 162 QDR (40 Gbps) auto-negotiating QSFP InfiniBand ports in an 11U switch
- Available bandwidth: up to 11.52 Tbps of non-blocking bandwidth
- Simple and fast device management
- Fully managed by Mellanox Unified Fabric Manager (UFM)
- Fast fabric bring-up and advanced routing algorithms
- Advanced congestion management
- Zero down time with no single point of failure and real-time fault notifications
- Support for longer and more varied cable options
- QSFP ports supporting either copper or optical cables
- Redundant hot-swappable Management Boards, power supplies, and fans meet stringent availability requirements
- InfiniBand™ specification 1.2 compliant.

1.3 Product Architecture

The Grid Director 4200 is a modular, rack-mountable chassis which can be configured for a wide range of applications.

Highlights of the Grid Director 4200 architecture:

- Up to nine (9) Line Boards (sLB-4018) with 18 QSFP InfiniBand QSFP external interfaces and 16 QDR 4X InfiniBand links for connectivity between the Line cards and the internal Switch fabric
- Supports up to four (4) vertical Fabric Boards (sFB-4200)
- Supports one or two redundant hot swappable Management Boards (sMB) for fabric management and chassis management; when two Management boards are installed, they support failover capabilities in the event of failure of one of the boards
- Up to four (4) Power Supply Units (sPSU-S) with N:1/N:N redundancy
- Front-to-rear air cooling system consisting of a Horizontal Fan Unit (sFU-42H) and a vertical Fan Unit (sFU-42V) for the Grid Director 4200
- Cabling for InfiniBand, management, and power located at rear of chassis
- Local and remote management and provisioning through CLI (Command Line Interface).

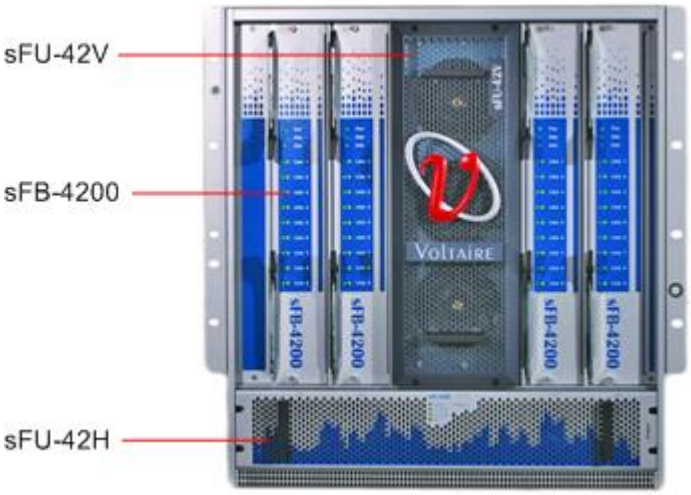
2 Getting Started

2.1 Grid Director 4200 Front Panel Description

The following sections provide a detailed description of the front and rear panels of the Grid Director 4200.

This section details the front panel of the Grid Director 4200.

Figure 3: Grid Director4200 Front Panel Description



The following table details the Grid Director 4200 front panel components (optimal configuration).

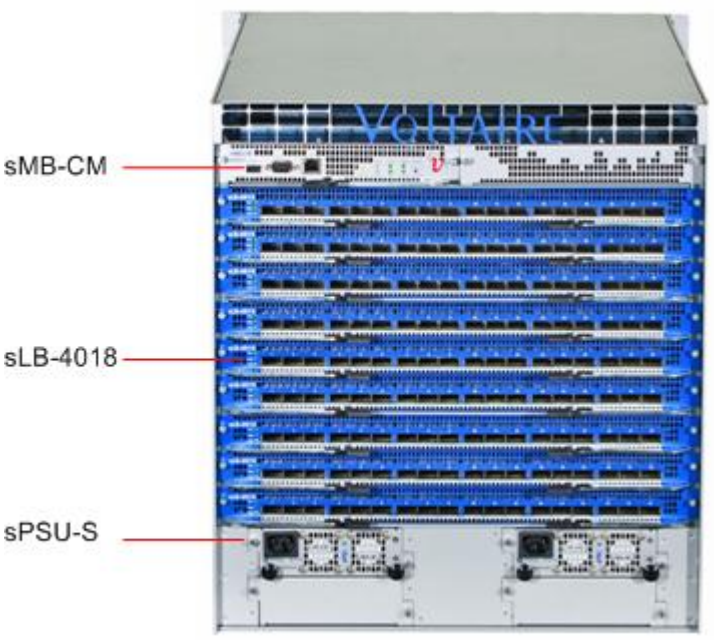
Table 1: Grid Director 4200 Front Panel Components

Component	No. of components	Description
sFB-4200	Up to 4 (according to configuration)	The Fabric Boards has 36 4X InfiniBand ports. It determines the total bandwidth of the switching Clos topology within the chassis.
sFU-42V	1	Vertical Fan Unit - Hot swappable fan unit hosting three internal fans for high availability. Auto-heat sensing allows for silent fan operation.
sFU-42H	1	Horizontal Fan Unit - Hot swappable fan unit hosting eight internal fans for high availability. Auto-heat sensing allows for silent fan operation.

2.2 Grid Director 4200 Rear Panel Description

This section details the rear panel of a Grid Director 4200 (optimal configuration).

Figure 4: Grid Director 4200 Rear Panel Description



The following table details Grid Director 4200 rear panel components.

Table 2: Rear Panel Components

Component	No. of components	Description
sLB-4018	Up to 9 (according to configuration)	Each line board has 18 external QSFP interfaces, and 16 internal 4X InfiniBand interfaces for connectivity between the Line cards and the Switch fabric. Line boards are installed at the rear of the chassis in a horizontal position. Each line board runs the Subnet Manager. 18 4X QSFP InfiniBand connectors for passive copper cables, active copper cables, active optical cables, and connect optical cables.
sMB-CM	Up to 2	Management Board RS232 serial interface - D-sub -9 pin connector (serial interface) for the CLI RJ-45 Connector - Gigabit Ethernet auto-negotiating RJ-45 Connector for management purposes. Speed: 1Gbps/100Mbps/10Mbps (& LED). Provides out-of-band management interface over a local network. USB connector (Type A) - One USB 2.0 Host interface allows you to increase the CPU flash memory by a connection to a standard Disk-On-Key device.
Power Supply (sPSU-s)	Up to 4 (according to	The swappable power supply modules provide the Grid Director 4200 DC supply. You can install up to four AC/DC

Component	No. of components	Description
	configuration)	100-240Vac to 48 Vdc hotswappable redundant power supplies in the Grid Director 4200. Entails an AC power Inlet.

The Grid Director 4200 rear panel has 9 slots in which you can install the Line Boards (sLB-4018).

2.3 Main Building Blocks

The main building blocks of the Grid Director 4200 are listed and described in the following sections.

2.3.1 Grid Director Midplane

The Grid Director includes a passive Midplane that connects the InfiniBand differential signals, control signals and power between the different boards in the chassis (Fabric Board signals are routed from the front of the chassis to the Midplane; Line Boards are routed from the rear of the chassis to the Midplane.) The Midplane is not field serviceable.

2.3.2 Line Boards

The rear side of the Grid Director 4200 can host up to up to 9 Line Boards (sLB-4018). Each line board has 18 external QSFP interfaces, and 16 internal 4X InfiniBand interfaces for connectivity between the Line cards and the Switch fabric. Line boards are installed at the rear of the chassis in a horizontal position.

2.3.3 Fabric Boards

The Grid Director 4200 supports up to four Fabric Boards (sFB) that are installed at the front of the chassis.

The sFB-4200 QDR Fabric Board is installed in a standard 162-port chassis, in a vertical position. Each sFB-4200 has 36 4x InfiniBand ports.

The Fabric Boards determine the total bandwidth of the switching CLOS topology within the chassis.

2.3.4 Air Flow Cooling System

The Grid Director 4200 uses front-to-back air flow cooling and provides full internal redundancy, monitored fans. Fan speed is dynamically controlled as a function of temperature.

The air cooling system includes a Horizontal Fan Unit (sFU-42H), containing eight fans and A Vertical Fan Unit (sFU-42V) containing three fans.

LED indicators on the Horizontal Fan Unit sFU-42H provide an on-site report on the operating conditions of the air cooling system modules, and provide an alarm indicator in the event of a high temperature condition.

2.3.5 Management

The Grid Director 4200 on-board device management provides a simple interface for deploying, troubleshooting, maintaining and upgrading the switch. You can use the CLI to perform routine tasks such as monitoring the switch operation or upgrade the software and firmware. The Grid Director 4200 comes with an onboard subnet manager, enabling simple, out-of the-box fabric bring-up for small to medium clusters.

The Grid Director 4200 works with Mellanox's Unified Fabric Manager (UFM), which automatically discovers, virtualizes, monitors and optimizes the fabric infrastructure and accelerates the active applications. UFM provides fast fabric bring-up by implementing routing algorithms that maximize the use of available fabric bandwidth and enable the creation of scale-out clusters from tens to thousands of nodes. To promote ultimate and flawless bandwidth and latency, Voltaire fabric optimization includes advanced congestion management capabilities for detecting congestion with advanced multi-path and adaptive routing capabilities to prevent degraded application performance.

For details on Grid Director 4200 software requirements and configuration, see the *Grid Director Family User Manual*.

2.3.6 Management Board

The Grid Director supports one or two hot-swappable Management Boards.

2.3.7 Power Supplies (sPSU-S)

Mellanox Grid Director switches support multiple power supply modules (sPSU-S) configured in redundant, hot-swappable, current sharing mode for N:1 or N:N redundancy (according to the configuration), and is suitable for 100-240 VAC mains voltage (auto-sense). The Grid Director 4200 supports up to four power supply modules.

2.3.8 Reset Buttons

In the rare event of a Grid Director 4200 system lock-up, the Reset button can be used to reset the system.

The system has two Reset buttons: one is located on the front panel of the sFU-42H fan assembly Horizontal Fan Unit, a second one is on each sMB-CM Management Board front panel.

2.3.9 Management Reset

To reset the Grid Director 4200, push any of the Reset buttons using a thick wire or the tip of a pen.

Pressing the Reset button for one to six seconds resets the sMB-CM Management Board only; pressing the Reset button for at least six seconds resets the entire chassis.

3 Unpacking and Packing the Grid Director 4200

3.1 Package Contents

The Grid Director 4200 is supplied in a heavy duty tri-wall cardboard box secured with packing straps.

Refer to System Configurations (on page 21) for information about the various 4200 configurations and items shipped with the chassis.

The basic 4200 shipping contents are as follows:

- Grid Director 4200 chassis
- Horizontal Fan Unit (sFU-42H)
- Vertical Fan Unit (sFU-42V)
- Management Board (sMB-CM)
- Two Power Supplies (sPSU-S)

Mellanox ships the Grid Director 4200 with a Horizontal Fan Unit (sFU-42H) and a Vertical Fan Unit (sFU-42V) installed at the front of the chassis and two power supplies at the rear of the chassis.

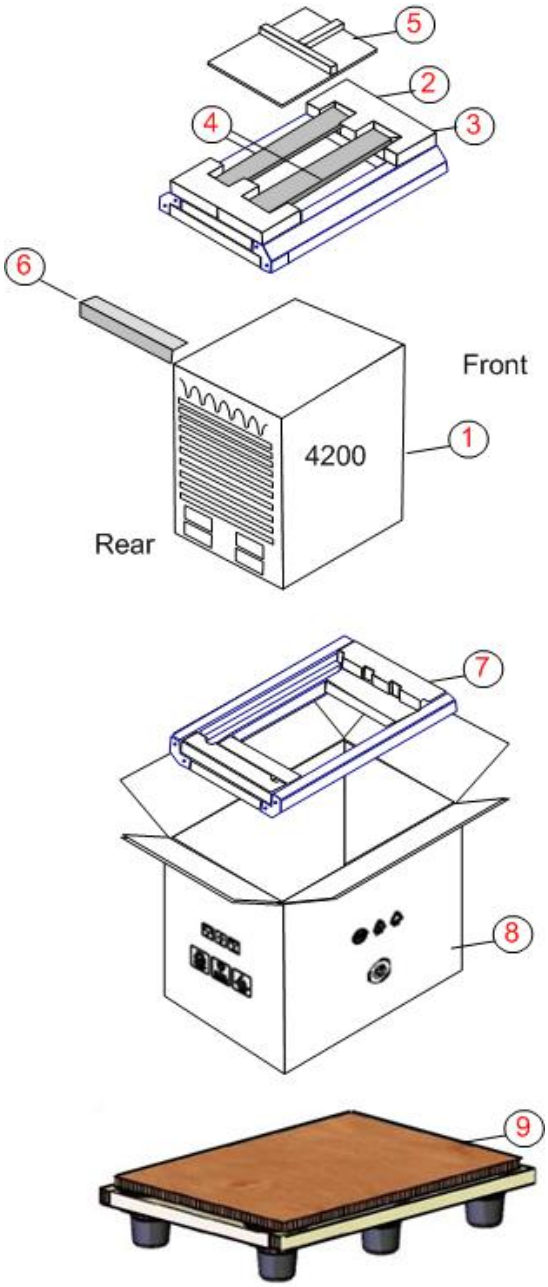
Additional components include:

- Rail Kit for rack installation
- Cabling Guide Brackets
- One power cord per Power Supply
- One console cable
- A grounding kit
- Getting Started Guide
- Two product CDs (one containing the software, one containing the documentation)

Before beginning the installation of the Grid Director 4200, verify that the package contains the items detailed in the packing list.

Check for loose parts or any visible damage to the contents. If any damaged or missing parts are detected, notify your local Voltaire representative.

Figure 5: Unpacking the Grid Director 4200 (Schematic)



1 - Grid Director 4200

2 - Top Foam

3 - Cable Management

4 - Mounting Rails (Left and Right)

5 - Foam Plate

6 - Carton Plate – placed at the top of the rear of the chassis to protect the opening

7 -Bottom Foam

8 - Cardboard Box

9 - Pallet

➢ ***To unpack the Grid Director 4200:***

1. Cut the packing straps and open the box.
2. Unpack the Grid Director 4200 chassis, as follows:

   Remove the box from around the chassis by sliding it upwards. The Grid Director 4200 chassis in its partially unpacked state is shown in the following figure.

   The upper packing foam covering the Grid Director 4200 contains the following components:

   - Rail kit
   - Cabling Guide Brackets (Cable Management)
   - Screw kit
   - Grounding kit
   - Console cable
   - Power cables
   - Getting Started Guide
   - CD with documentation and software utilities on top of the Grid Director 4200 wrapped in an anti-static bag

3. Remove all of the accessories listed above and as well as the packing foam on top of the chassis.

4. Lift the Grid Director 4200 from the pallet and place it on a flat surface. Due to its heavy weight, two people are needed to lift the Grid Director 4200.

NOTE:

Use the four handles at bottom of chassis to slide the unit into its place.

CAUTION:

Use safe lifting procedures when moving the unit to avoid personal injury.

3.2 Packing the Grid Director 4200

You may need to move the Grid Director 4200 to a different location; should this be necessary, pack the equipment as described below.

➢ ***To pack the Grid Director 4200 chassis:***

1. Insert the foam grip on the pallet.
2. Position the Grid Director 4200 on the foam. Verify that the two sFU-42H Horizontal Fan Unit handles at front of chassis point to the two niches in the bottom foam.
3. Place the foam plate then the top foam on top of the chassis. The foam protection padding fits snugly over the chassis top.
4. Insert the accessories in the top foam dedicated locations.
5. Slide the cardboard box over the chassis and foam with the flaps facing up. Make sure it sits well on the pallet indent.
6. Fasten the box and secure it with the pallet using packing straps.

NOTE:

The packing list and part numbers (bar codes) are glued to the box. Safety labels are printed on the box.

Figure 6: Grid Director 4200 Packed

4 System Configurations

4.1 Configuration Summary

The following sections provide summary descriptions of system configurations.

4.1.1 Module Configuration per Chassis

The following table provides a comprehensive list of modules as well as the maximum number of modules that can be installed in a Grid Director 4200 system.

Table 3: Module Configuration per Chassis

Module	Name	Description	Number of Modules per chassis
Line Board	sLB-4018	Includes 18 QSFP ports	Up to 9
Fabric Board	sFB-4200	Includes 36 4x internal ports	Up to 4
Power Supply	sPSU-S	AC/DC Power supply	Up to 4
Vertical Fan Unit	sFU-42V	Vertical Fan Unit	1
Horizontal Fan Unit	sFU-42H	Horizontal Fan Unit	1
Management Board	sMB-CM	Chassis Management Board	Up to 2
Cable Management Right	N/A	Right Cabling Guide Brackets for cable management	1 (right)
Cable Management Left	N/A	Left Cabling Guide Brackets for cable management	1 (left)

4.1.1.1 Summary of Cabling Management and Rail Kit

- Cable management (standard)
- Rail kit
- 19" bracket attached to the chassis

4.1.2 Specifications Summary

The following table summarizes the Grid Director 4200 specifications.

Table 4: Feature Summary Table

Feature	Grid Director 4200
Rack Height	11U
Rack Width	19"
Switch Type	Director
Backplane Bandwidth	11.52 Tbps

Feature	Grid Director 4200
Line Board Slots	9
Fabric Board Slots	4
Max # of InfiniBand Ports	162 40 Gbps InfiniBand Ports
Interface Type	QSFP 40 Gbps (QDR) QSFP ports with support for optical adapters and cables
Redundant Components	Power Supplies (sPSU-S) Management Boards (sMB-CM)
Embedded Chassis Management (CLI)	Yes

4.2 Grid Director 4200 Configuration and Part Numbers

The following table details the basic configuration of your Grid Director 4200.

Table 5: Grid Director 4200 Basic Configuration

Product Description	Product/Module Name	Mellanox P/N
Grid Director 4200 9-Slot QDR Basic Configuration	Grid Director 4200	VLT-30060
sFB-4200 QDR Fabric Board	sFB-4200	VLT-30061
sLB-4018 18-Port QDR Line Board	sLB-4018	VLT-30043
sMB-CM Chassis Management Board	sMB-CM	VLT-30044
sPSU-S 1.4KW AC Power Supply Module	sPSU-S	VLT-30046
sFU-42H Horizontal Fan Unit	sFU-42H	VLT-30047-F
sFU-42V Vertical Fan Unit	sFU-42V	VLT-30048-F

The above parts can be ordered separately. The following table provides the list of additional spare parts and accessories.

Table 6: Spare Parts and Accessories

Description	Comment	Mellanox P/N
Cable Management Right	Delivered with the switch	KIT-00032
Cable Management Left		KIT-00031

InfiniBand products are RoHS-6 compliant.

5 Technical Specifications and Certifications

5.1 Grid Director 4200 Technical Specifications

The following details the Grid Director 4200 technical specifications.

5.2 Architecture

- 4 slots for Fabric Boards in the front of the chassis
- 9 slots for Line Boards in the rear panel
- Based on passive Midplane board which allow the IB differential signals, control signals and power connectivity between the different boards in the chassis
- Cables for InfiniBand, management, and power all located at the rear
- Up to 162 InfiniBand QSFP (40 Gbps) ports
- Bisectional switch bandwidth (QDR): 11.52 Tbps

5.3 Fabric Board (sFB-4200) Specifications

- Up to 4 hot-swappable Fabric Boards running at Quad Data Rate (QDR) which support the switching CLOS topology.
- Hot-swappable operation with no traffic disruptions to the rest of the system.
- On board high performance, low power CPU for low-level chassis management purposes.
- EEPROMs to store the switch ASIC ERP (Embedded RISC processor) code.
- Indicators: Physical connectivity and logical connectivity LEDs per Line Board link port, power, Rdy and Info LED.
- On-board temperature monitoring reported to Management system.
- Thermal shutdown for over temperature sensing.

5.4 Line Board (sLB-4018) Specifications

- Up to 9 sLB-4018 hot-swappable Line Boards (sLB) running at 40 Gbps Quad Data Rate (QDR)
- 18 auto-sensing QSFP InfiniBand ports (40 Gbps)
- Hot-swappable operation with no traffic disruptions to the rest of the system
- All ports support copper or optical cables
- Indicators: Physical connectivity and logical connectivity LEDs per port, power, Rdy and info LEDs

- On board high performance, low power CPU for low-level chassis management purposes
- On-board temperature monitoring reported to Management system
- Thermal shutdown for over temperature sensing.

The following table provides additional sLB-4018 specifications.

Table 7: 4200 Line Board (sLB-4018) Specifications

Item	Specification
Data throughput QDR	2.72 Tbps
Port-to-port Latency	Under 100 nanoseconds
Data Virtual Lanes	8
Management Virtual Lanes	1
MTU	4096 Bytes, max
Maximum hops	1 hop between ports on the same board. 3 hops between different Line Boards in the same chassis.

5.5 Management Board (sMB-CM) Specifications

The following table details the sMB-CM specifications.

Table 8: 4200 Management Board (sMB) Specifications

Management Board (sMB)	
Two hot swappable Management Boards, each including on board CPU:	
LEDs	Refer to the LED Indications section.
Connectors	10/100/1000 Ethernet RJ45, RS-232 - DB-9 USB port
Reset button	Resets the Management Board or the entire chassis.

5.6 Chassis Slot Numbering

Front of Chassis

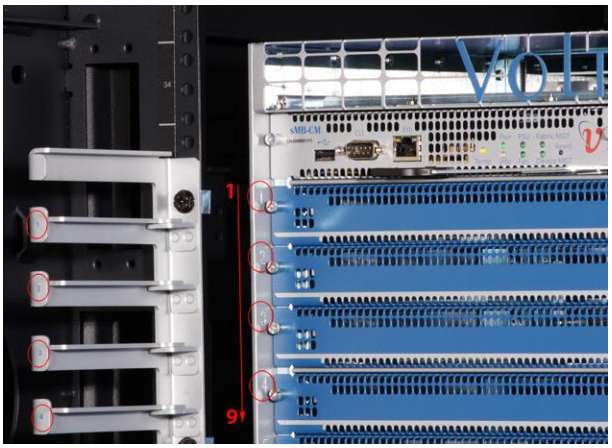
Slot numbering at the front of the chassis for Fabric Boards is from left to right (indication is on the Horizontal Fan Unit sFU-42H).

Figure 7: sFU-42H Horizontal Fan Unit

Back of Chassis

Slot numbering at the rear of the chassis (for Line Boards) is from top to bottom. The numbering indication is on the left and right side of the chassis adjacent to the ejectors.

The cable guide brackets also have the line board numbering.



For specific instructions, please refer to Installing System Boards (on page 53).

5.7 Torque Settings

The following table provides the torque settings for module assembly.

Table 9: Torque Settings for Module Assembly

Assembly	Torque (in/lb)
sLB-4018 Line Board to chassis	2 (or use manual screwdriver)
sLB-4200 Fabric Board to chassis	2 (or use manual screwdriver)
sMB Management Board to chassis	2 (or use manual screwdriver)
Rail kit part A to part B	10
Rail to chassis	10
Fabric Board to chassis	2 (or use manual screwdriver)

5.8 Module Configuration Rules

The Grid Director 4200 supports up to two Management Boards that are used for redundancy/failover implementation. Use slot one (left) when only one Management Board is installed. For more information, see Installing the Management Board (sMB-CM) (on page 59).

The Grid Director 4200 supports any Fabric Board configuration (between 1 and 4).

When installing the Line Boards, start at the bottom of the chassis. For more information, see Installing the Line Board (sLB-4018) (on page 58).

5.9 Racking Rules - Clearance Requirements

The following table lists the racking rules and clearance requirements.

Table 10: Clearance Requirements

Area	Recommended Minimum Clearance
Front of the rack	36" (90 cm) for technician access and maintenance
Rear side of the rack	24" (60 cm) for human accessibility
Sides of the rack	No limits
Space below the chassis	No limits
Space on top of the chassis	No limits

5.10 Power Data

5.10.1 Type of Power Cord on the Power Supply

With each Power Supply, Mellanox provides a 15Amp cord (2 meter jumper), with a universal plug for a PDU (Power Distribution Unit). This cord is detachable from the Grid Director 4200 Power Supply. Cable wiring: 3x14AWG.

5.10.2 Power Requirements

The following table provides the Grid Director 4200 power requirement specifications.

Table 11: Grid Director 4200 Power Requirements

Item	Description
Power Supply Modules (sPSU-S) with N:1 or N:N redundancy. Note: each Power Supply has its own power cord.	Up to 4 Power Supplies
Electrical Rating	100-120/200-240V, 50-60Hz, 60A 12/8A per power feed MAX
Typical Power Consumption (QDR full configuration)	2000 Watt
Leakage current @254 V [mA]:	>6mA RMS (Note that leakage exceeds 3.5mA when more than one power supply is being used)
Indicators	Operational AC and DC Status LEDs
Operating voltage	100-240 VAC, 50-60 Hz auto-sensing
Power factor	0.98 typical at 230 VAC, full load 0.98 typical at 115Vac, full load
Temperature rating	0-45 degrees Centigrade

5.10.3 Power Characteristics

The following table details the Grid Director 4200 single power supply characteristics.

Table 12: Single Power Supply Characteristics

Attribute	Specification
Power Entry	90 – 254 volts, 47 – 63 Hz, auto-sensing
Power Rating	1400 Watts @ 220V per module 1200 Watts @ 110V per module
Nameplate Power Rating (VA)	Input: 100V-240Vac @ 16A; Output: 48Vdc @ 29A
Nameplate Power Rating at 100V	12 A
Nameplate Power Rating at 200V	8 A
Power Factor (W/VA)	0.98 typical at 230 Vac, full load; 0.98 typical at 115 Vac, full load. Comment: Watts = Volts x Amps x Power Factor
Power Supply Efficiency	89% typical at 230Vac, full load rated power; 85% typical at 115Vac, full load rated power. Comment: A measure of the ability of the power supply to convert source AC power into usable DC power

5.10.4 Power Data per Module

The following table provides the power data per module.

Table 13: Power Data per Module

Module Name	Module	Watts/ Module	Configured Qty	Total Watts
Fan Tray	sFU-42H	300	1	300
Fan Tray	sFU-42V	150	1	150
Management Board	sMB-CM	45	2	70
18-port Line Board	sLB-4018	110	9	990
Fabric Board	sFB-4200	110	4	440

5.10.4.1 Calculating the Required Number of sPSU-S Power Supply Modules

To find the minimum number of power supply modules required for a given switch configuration, follow these steps:

- According to the built configuration, add-up all DC power consumption numbers. The sPSU-S is designed to provide 1400 Watt max. @220VAC or 1200W max @110VAC.
- Increase the number of sPSU-S modules according to redundancy requirements

These steps provide a margin for momentary power peaks and enhances reliability by preventing the power subsystem from continuously operating at maximum power.

For redundancy (N:1 or N:N), configure additional power supplies.

Table 14: Module Power Data

Description	Module Name	DC Power Consumption [Watt] (*)
Basic chassis configuration Single Management Board Horizontal Fan Units Vertical Fan Unit Two Power Supply Units	4200 sMB sFU-42H sFU-42V 2 x sPSU-S	485.0
Fabric Board	sFB-4200	110.0
sMB	sMB-CM	45.0
Line Board	sLB-4018	110.0
(*) Add 1.5 Watt for each connected QSFP optical module		

Table 15: Spare Parts for Grid Director 4200

Description	Module Name	DC Power Consumption [Watt]
sFU-42H, Horizontal Fan Unit	sFU-42H	300.0
sFU-42V, Vertical Fan Unit	sFU-42V	150.0

5.11 Calculating Heat Output in BTUs

To compute the approximate BTUs for a given configuration, find the power consumption in Watts, for example, from Power Data Per Module, and multiply by 3.408. Example calculations for specific configurations are shown in Table 5-11.

Table 16: BTUs for QDR Sample Configurations

Configuration	Modules Included	Power (Watts)	Heat Output (BTUs)
18 ports per sLB-4018	4 sFB-4200, 1 sLB-4018, 1 sFU-42H, 1 sFU-42V, 1 sMB, 2 sPSU-S	1,190	4,061
108 ports (6 sLBs x 18 port per sLB)	4 sFB-4200, 6 sLB-4018, 1 sFU-42H, 1 sFU-42V, 1 sMB, 2 sPSU-S	1,823	6,219
162 ports QSFP copper	4 sFB-4200, 9 sLB-4018, 1 sFU-42H, 1 sFU-42V, 2 sMB, 3 sPSU-S	2,243	7,651

5.12 Cooling

Heat dissipation (max. for full configuration): 8,700 BTU/Hour

5.13 Airflow

Rated volumetric air flow for a fully configured chassis:

- Front-to-rear cooling

- 8700 BTU/Hour max
- The Rated volumetric air flow for a fully chassis is 440 CFM (Cubic Feet per Minute).

5.14 Physical Characteristics

The following table lists the Grid Director 4200 physical characteristics.

Table 17: Grid Director 4200 Physical Characteristics

Grid Director 4200 Features		Characteristics
19" rack mountable chassis		11U height
Dimensions	Width	19" (440 mm)
	Depth	22.75" (578 mm)
	Height	25.6" (650 mm)
Weight		128 to 163 lbs (58 to 74 kg), depending on configuration
Minimum rack depth required for the rail kit		N/A
Maximum rack depth required for the rail kit		N/A

5.15 Weights and Dimensions

The following table details the Grid Director 4200 and modules weights and dimensions.

Table 18: Table -. Grid Director 4700 Weights & Dimensions

	Metric (2)				English (1)			
Unpacked Modules	**D (cm)**	**W (cm)**	**H (cm)**	**Kg**	**D (in)**	**W (in)**	**H (in)**	**Lbs**
Packed Modules	**D**	**W**	**H**	**Kg**				
sMB-CM	33	22	4.5	1.1	13	8.7	1.77	2.42
	40	28	7.5	1.4	15.7	11	3	3
sPSU-S	36	13	4.5	1.85	14	5	1.8	4
	42	21	12	2.6	16.5	8.2	4.7	5.7
sFU-42H	33	43	12	3.9	13	17	4.7	8.6
	44	52	19	4.5	17.3	40.4	7.4	9.9
Chassis	68	44	84	81	26.77	17.32	33	178.57
	88	57	119	110	34.6	22.4	46.85	242.5
sFU-42V	38	67	14	4.8	15	26.3	5.5	10.6
	46	73	22.5	6.2	18	28.7	8.85	17.7
sFB-4200	66	32	4	3.2	30	12.6	1.57	7
	78	40	7	3.9	28.7	16	3.54	8.6

	Metric (2)				English (1)			
Unpacked Modules	**D (cm)**	**W (cm)**	**H (cm)**	**Kg**	**D (in)**	**W (in)**	**H (in)**	**Lbs**
Packed Modules	**D**	**W**	**H**	**Kg**				
sLB-4018	43	33	4	2.9	17	13	1.57	6.4
	51.5	40	9.5	3.5	20.2	15.7	3.74	7.7
Blank sFB	66	32	4	1.9	30	12.6	1.57	4.2
	78	40	7	2.6	30.7	15.75	2.75	5.7
Blank sLB	43	3	4	0.26	17	1.18	1.57	0.57
	63	8	3.5	0.36	24.8	3.14	1.38	0.8
Blank sMB	4	22	4	0.12	1.57	8.66	1.57	0.26
	63	8	3.5	0.22	24.8	3.14	1.38	0.48
Blank PS	4	15	5	0.09	1.57	6	2	0.12
	63	8	3.5	0.19	24.8	3.14	1.38	0.42
Rail Kit	53.2	14.5	4.3	9	21	5.7	1.7	19.84
	62	14	7.5	8	24.5	5.5	2.95	17.63
Cable Mgmnt	64	13	4	2.8	25	5	1.57	6.17
	75	23	15	3.7	29.5	9	6	8.15

(1) 1 in = 2.54 cm (2) 1 kg = 2.205 lbs

5.16 LED Indications

The following tables detail the Grid Director 4200 modules LED Indications.

5.16.1 sLB-4018 Line Board LEDs

Table 19: sLB-4018 LEDs

Indication	LED Description	Remarks
Link State 9 LED pairs: Amber + Green HW only	The two LEDs in each pair are as follows: • Green – ON indicates physical link up • Amber – ON indicates logical link up The LED states are as follows: • OFF – no link detected • ON – the port has a link • Blinking: • - Green – indicates errors • - Amber – indicates data activity	Indicates the state of the QSFP connectivity.
Power (Green) HW only	ON – indicates that all board voltage levels are operating normally	

Indication	LED Description	Remarks
	OFF – indicates a problem in power supply to the board	
Info (Blue) User only	General purpose LED for management use OFF – No attention required Blinking – Chassis attention required	
Card Ready (Green)	OFF – Card not Ready ON – Card ready Blinking Slowly – Card loading Blinking Fast – Card problem	

5.16.2 Fabric Board (sFB-4200) LEDs

Table 20: sFB-4200 LEDs

Indication	LED Description	Remarks
Link 9 LED pairs: Amber + Green HW only	Each pair of LEDs indicates the state of ports of each Line Board. The two LEDs in each pair are as follows: • Green – ON indicates physical link up • Amber – ON indicates logical link up The LED states are as follows: • OFF – no link detected • ON – link detected • Blinking: • - Green – indicates errors • - Amber – indicates data	9 pairs of internal link indication LEDs. Each pair of LEDs indicates the state of four ports of each Line Board.
Power (Green) HW only	ON – indicates that all board voltage levels are operating normally OFF – indicates a problem in power supply to the board	
Info (Blue) User only	General purpose LED for management use OFF – No attention required Blinking – Chassis attention required	
Card Ready (Green)	OFF – Card not Ready ON – Card ready Blinking Slowly – Card loading Blinking Fast –Card problem	

5.16.3 Management Board (sMB-CM) LEDs

Table 21: sMB-CM LEDs

Indication	LED Description	Remarks
Fans (Green)	Off- All fan drawer are OK On - Vertical and Horizontal fan units fault indication. Indicates that at least one of the 11 fans has failed.	Two Fans drawers
Temp (Orange)	Indicates an over-temperature fault on the chassis: OFF – indicates normal temperature levels ON – indicates on over-temperature fault	Temp (Orange)
FM Active (Green)	OFF - Fabric Manager is not active ON - Fabric Manager running on the Management Board Blink - Fabric Manager is standby on the Management Board	
DM Active (Green)	OFF - Device Manager is not active ON - Device Manager running on the Management Board	
Power (Green) HW Only	OFF – indicates a problem in power supply to the board ON – indicates that all board voltage levels are operating normally	
Info (Blue) User only	General purpose LED for management use OFF – No attention required Blinking – Chassis attention required	
PSU OK (Green)	OFF – N/A ON – System Power OK Blinking – System Power problem	AC-DC power supply fault indication. Indicates that at least one of the main AC-DC power supplies has an AC or DC fault
Eth—1 and 2	Two LEDs: Link (Green) and Activity (Orange)	Eth—1 and 2

5.16.4 sFU-42H Horizontal Fan Unit LEDs

Table 22: sFU-42H LEDs

Indication	LED Description	Remarks
Temp (Orange)	Indicates an over-temperature fault on the chassis: OFF – indicates normal temperature levels ON – indicates on over-temperature fault	
sFU-42V (Orange)	Vertical fan unit fault indication. Indicates that at least one of the three fans has failed. Off- All fan drawer are OK On - Vertical fan units fault indication. Indicates that at least one of the three fans has failed.	
sFU-42H (Orange)	Vertical fan unit fault indication. Indicates that at least one of the eight fans has failed.	

Indication	LED Description	Remarks
	Off- All fan drawer are OK On - Horizontal fan units fault indication. Indicates that at least one of the eight fans has failed.	
PS (Orange)	AC-DC power supply fault indication. Indicates that at least one of the main AC-DC power supplies has an AC or DC fault. Off- All PSUs OK ON- Fault	

5.17 sPSU-S Power Supply LEDs

Table 23: sPSU-S LEDs

Indication	Description
DC ON (Green)	ON – Indicates that the DC power source is present.
AC ON (Green)	ON – Indicates that the AC power source is present.

5.18 Environmental Specifications

The following table details the environment specifications for the Grid Director 4200.

Table 24: Grid Director 4200 Environmental Specifications

Ambient Operating Temperature	32° to 113°F (0° to 45°C)
Operating Humidity	15 to 80%, non-condensing
Operating Altitude	0 to 9843 ft (3000m)
Storage Temperature	-13° to 158°F (-25° to +70°C)
Storage Humidity	5 to 90% non-condensing
Storage Altitude	0 to 15,000 ft (4570m)

5.19 Acoustic Data

Acoustic noise is reported in accordance with ISO 7779 [ECMA 74] standard.

5.20 Reliability (MTBF)

The Mean Time between Failures (MTBF) for individual switch components is shown in the tables below. These figures indicate the mean elapsed time until a single component fails in the module, whether or not that failure impacts the operation of the switch. Note that in many cases redundant modules can be configured, which dramatically increases the overall system Mean Time between Critical Failures (MTBCF).

5.20.1 4200 system configuration for MTBF calculation

The system configuration is a fully populated chassis with 9 line cards, 4 fabric cards, 4 power supplies, 1 Management Board and 2 fan modules(Horizontal and Vertical drawers).

Table 25: 4200 System MTBF

4200 QDR Director	FPMH	MTBF (Hours)
System MTBF value	39,158	25,537

5.20.1.1.1 MTBF Per Module

Table 26: MTBF per Module Data

Chassis/Module	Description	MTBF (Hours)
sFB-4200	4 QDR port connections Fabric Board	465,699
sLB-4018	sLB-4018, 18 QSFP ports per sLB-4018	419,866
sMB-CM Management Board	Management Board	441,273
sFU-42H Horizontal Fan Unit FRU	Horizontal fan unit	708,754
sFU-42V Vertical Fan Unit FRU	Vertical fan unit	913,145
sPSU-S	Power supply	1,151,543

5.21 Certifications

The following table lists the 4200 certifications.

Table 27: Certifications

Safety:
cMETus UL 60950-1:07 Second Ed.
CSA C22.2 No. 60950-1-07 Second Ed
cTUVus UL60950-1: 07 **Second** Ed.
S-Mark Argentina
CB Certificate and report, according to IEC 60950-1 Second Ed.
KCC Korea
Gost-R
CE according to EN 60950-1:06 **Second** Ed

EMC Certifications:
FCC Part 15, Subpart B, Class A:2009
Industry Canada ICES-003 (CAN/CSA-CEI/IEC CISPR 22:02)
• CE EN55022: 1998 + A1:2000 + A2:2003
• EN55024: 1998 + A1:2001 + A2:2003
• EN 61000-3-2: 2006 Harmonic current emissions EN 61000-3-3:95+A1(01) + A2(05) Voltage fluctuations and flicker

EN 61000-4-2: 1995 + A1: 98 + A2: 2001 EN 61000-4-3: 2006 EN 61000-4-4: 2004 EN 61000-4-5: 2006 EN 61000-4-6: 2007 EN 61000-4-8: 1993 + A1(01) EN 61000-4-11: 2004
Japan VCCI Technical Requirements, V-3/2008.04, Class A.
Australian/New Zealand C-Tick, AS/NZS CISPR 22:2009
KCC Korea

Restricted Hazardous Substances Certification:
RoHS-6

InfiniBand Certification:
IBTA 1.2

5.22 Declarations

5.22.1 Declaration of Conformity

Mellanox products comply with the Radio & Telecommunications Terminal Equipment Directive 99/5/EEC, the EMC Directive 2004/108/EC, and of the Low Voltage Directive 2006/95/EC.

5.22.2 Hazardous Substances (RoHS 6) Compliance Declaration

Mellanox products comply with the RoHS directive.

5.23 Label(s)

The Grid Director 4200 label (example) below shows safety and EMC text and logos.

Figure 8: Grid Director 4200 Safety and EMC Label (Example)

4200
VOLTAIRE
P/N :
PPPPPPPP RRR
S/N :
MMWWYYxxxxxx
* See Installation Instructions before connecting to the Power Supply
* Voir la notice d'installation avant de reccorder au r'eseau
* Vordem ansch liessen ans Netz dle Installations anweisungen beachten
100-120/200-240V. 50-60Hz, 40A
12/8A per power feed MAX
This de vice complies with part 15 of FCC rules.
Operation is subject to the following two conditions:
(1) This device may not cause harmful interference
(2) This device must accept any interference received, including interference that may cause undesired operation
Canada ICES/NMB-003 Class/Classe A
N420
UL 60950-1
CSA C22.2 No. 60950-1
E112713
この装置は、クラスＡ情報技術装置です。この装置を家庭環境で使用すると電波妨害を引き起こすことがあります。この場合には使用者が適切な対策を講ずるよう要求されることがあります。
VCCI－A

5.24 Gost-R Certification

Mellanox products comply with the Gost-R Russian safety regulations.

5.25 KCC-Korea Certification

Mellanox products comply with the Korean KCC regulations.

5.26 List of Oscillator Speeds

The following table lists the Oscillator Speeds.

Table 28: Oscillator Speeds

Voltaire PN	Description	Frequency	Card
141C00005	CRYSTAL PECL156.25MHZ, JOE75-SMD, H=1.4MM	156.25 MHz	sFB-4200, sLB-4018
OSC-00005	OSCILLATOR PECL 100MHZ 7 X 5 X 1.9MM +50PPM	100MHz	sFB-4200, sLB-4018, sMB-CM
141C71200	OSCILLATOR 125MHZ 5.0 X 7.0 X 2.0 MM	125MHz	sFB-4200, sLB-4018, sMB-CM

Voltaire PN	Description	Frequency	Card
OSC-00009	OSCILLATOR, 2.5V HCMOS/TTL 66.66MHZ 50 PPM	66.66MHz	sFB-4200, sLB-4018, sMB-CM
141C65000	OSCILLATOR 50MHZ 7.5 X 5.0 X 1.4 MM 3.3V +50PPM	50MHz	sFB-4200, sLB-4018
OSC-00008	OSCILLATOR 3.3V CMOS 48MHZ 50 PPM	48MHz	sMB-CM
OSC-00007	OSCILLATOR HCMOS/TTL 25MHZ	25MHz	sMB-CM
OSC-00011	OSCILLATOR HCMOS/TTL 25MHZ 2.5V	25MHz	sFB-4200, sLB-4018
OSC-00010	OSC. HCMOS/TTL 25MHZ 1.8V 50PPM TR=4NS MAX 7X5MM	25MHz	sMB-CM
OSC-00006	OSCILLATOR SE 1.8V 19.2MHZ +-50PPM	19.2MHz	sMB-CM

5.27 Shock and Vibration Test Reports

Prepare the Grid Director 4200 to ship by carefully following the rail kit installation instructions, as detailed in Rail Kit Assembly Overview. The Grid Director 4200 is susceptible to shock and vibration if the rail kit installation instructions are not followed precisely.

The following tables detail the Grid Director 4200 compliance to shock, vibration and free fall tests for operation and transportation modes.

Table 29: Vibration

Test	Description	
Vibration Axes	3 axes (X,Y,Z)	
Non-Operating Random Vibration	Frequency range:	5-300Hz
	Vibration level:	Z axis, 1.03g RMS X,Y axis 0.698g RMS
	Vibration test for each axis	60 minutes
Operating Sine Vibration	Frequency range:	5-500Hz
	Vibration level:	0.1G peak
	Vibration test for each axis	40 minutes
Operating Shock (half-sine)	Vibration Level	Z axis, 5g peak
	Shock test for Z axis	3 shocks, 10ms duration each shock

Table 30: Free Fall

Test	Description
Drop Height	0.3 meter
Number of drops of test item	Two drops performed on the bottom face when system is packed on its dedicated pallet.
Total number of drops	2 drops

5.28 Export Information

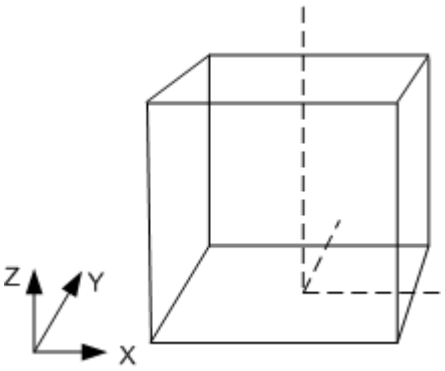
The Mellanox Grid Director Export Control Classification Number (ECCN) is as follows:

- ECCN: 5A002.a.1
- Shipping restrictions: None.

5.29 Center of Gravity Data

This section provides the 4200 center of gravity specifications. The measurement origin starts at the front lower left corner of the chassis.

Figure 9: Center of Gravity Data



Center of gravity for minimum, typical, and maximum configurations are detailed in the following table. The measurement origin starts at the front lower left corner.

Table 31: Grid Director 4200 Center of Gravity Data

Grid Director 4200	Width (X) - mm	Depth (Y) - mm	Height (Z) - mm
Empty Chassis	220	320	240
Basic Configuration	220	310	210
Full Configuration	220	360	250

6 Hardware Installation

6.1 Preparing for Installation

Read the following sections prior to performing the installation.

6.1.1 Tools Required for Installation

The materials and tools required to mount the Grid Director 4200 chassis into a rack are listed in the table below.

Table 32: Material and Tools Required

Quantity	Description
1	Phillips screwdriver
1	Utility knife
1	Measuring tape
1	Crimping tool
1	Wire stripping tool
1	Digital Voltmeter (DVM)
	Floating nuts
	Phillips screws

6.1.2 Site Planning

Planning the proper location and layout of your equipment rack is essential for successful Grid Director 4200 operation. Equipment placed too close together or in an inadequately ventilated area can cause system over temperature conditions. In addition, poor equipment placement can make system panels inaccessible and difficult to maintain.

To ensure normal operation and avoid unnecessary maintenance, plan your site configuration and prepare your site before installation.

Site Environment Specifications on page lists the operational and non-operational environmental site requirements for the Grid Director 4200. Within specified environmental ranges, the system can continue to operate; however, a measurement that approaches the minimum or maximum of a range indicates a potential problem. You can maintain normal operation by anticipating and correcting environmental conditions before they exceed the maximum operating range. Verify the site power for the type of device you are installing. Power requirements are useful for planning the power distribution system needed to support the Grid Director 4200. Heat dissipation is an important consideration for sizing the air-conditioning requirements for an installation.

Refer to the Requirements sections for Grid Director 4200 power and heat ratings.

CAUTION:

To prevent a loss of input power, verify that the total maximum load on the circuit supplying power to the power supply is within the current ratings of the wiring and breakers.

6.1.3 Rack Requirements

Mount the 11U Grid Director 4200 in a standard 19 rack with the Fabric Boards facing the front of rack and the Line Board InfiniBand ports and sMB-CM facing the rear of the rack.

The rack should support the mechanical and environmental characteristics of a fully populated Grid Director 4200, as listed in Site Environment Specifications.

The rack mounting holes conform to the IEA-310 standard for 19-inch racks. Precautions should also be taken to guarantee proper ventilation and ambient temperature is maintained for air intake at the front of the chassis and exhaust in the rack. Refer to the section on Racking Rules – Clearance Requirements.

6.1.4 Clearance Requirements

Sufficient clearance must be provided around the racks to install and maintain the Grid Director 4200. Clearance specifications are detailed in Racking Rules - Clearance Requirements.

6.1.5 Site Environment Specifications

Within specified environmental ranges, the system can continue to operate; however, a measurement that approaches the minimum or maximum of a range indicates a potential problem. You can maintain normal operation by anticipating and correcting environmental conditions before they exceed the maximum operating range.

6.1.6 Chassis Grounding

NOTE:

Carefully read the safety warnings throughout this document.

CAUTION:

Grounding connection is performed at the customer's site. Connect the chassis to a reliable earth ground. Ensure that the host is connected to earth ground during normal use.

As a rule of thumb, remember that the ground wire should ALWAYS be the FIRST thing you hook up, and the last thing that you disconnect.

Never defeat the ground conductor or operate the equipment in the absence of a suitably installed ground conductor. Contact the appropriate electrical inspection authority or an electrician if you are uncertain that suitable grounding is available.

NOTE:

The Grid Director 4200 is delivered with a grounding stud kit. The system must be permanently grounded using the grounding stud.

The grounding kit includes the following items:

- A 10-32 5/8" screw
- 3 spring washers
- 2 nuts #10
- Ground label
- Safety warning label

NOTE:

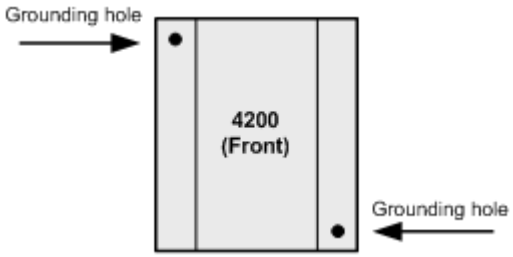
This grounding procedure requires a 6 AWG Grounding Cable.

Figure 10: Grid Director 4200 Grounding Connection

The Grid Director 4200 provides two grounding options.

For convenience, grounding can be performed from any of these locations.

Figure 11: Grounding Holes for the 4200 Grid Director



NOTE:

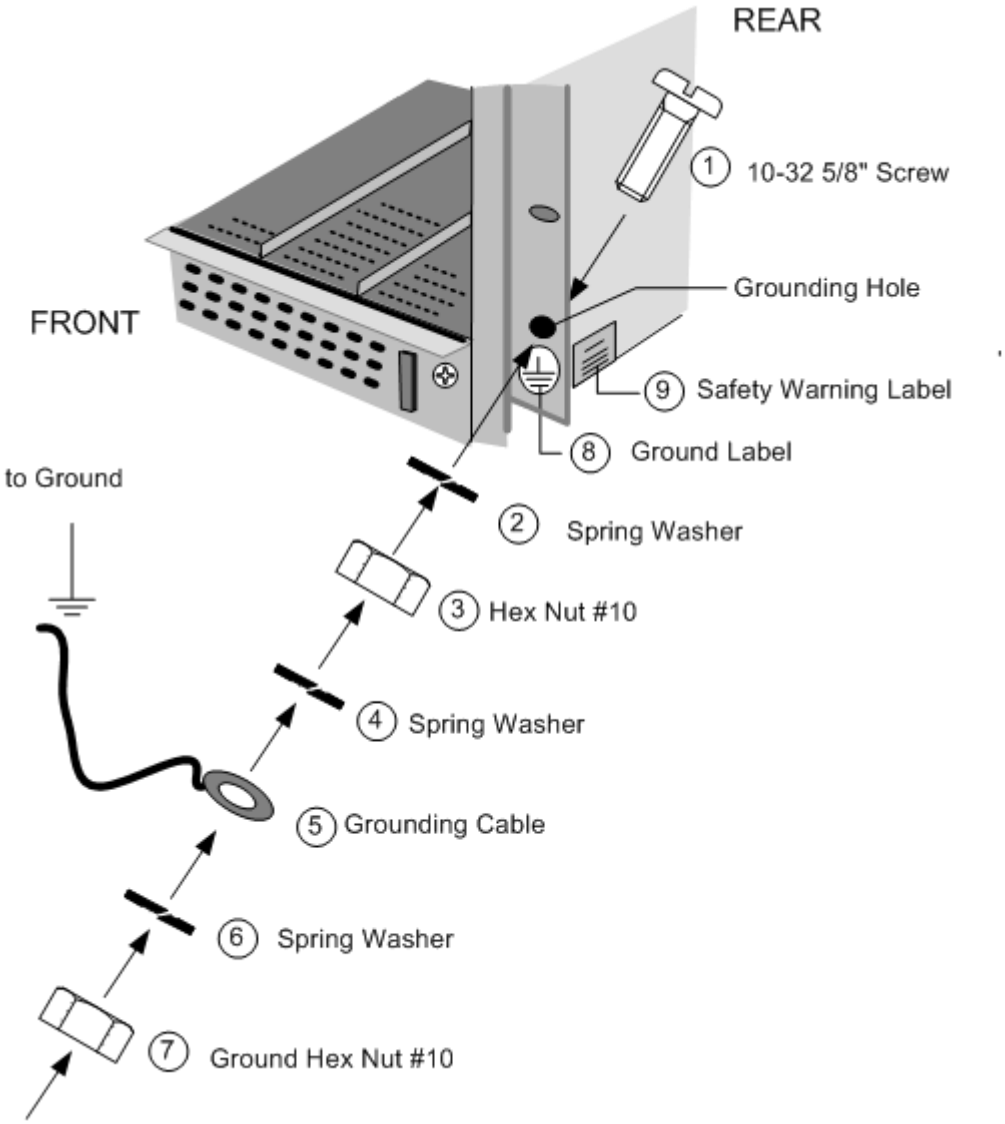
Grounding Stud installation is performed before mounting the Grid Director 4200 onto the rack.

➢ ***To install the Grounding Stud:***

1. Insert a 10-32 5/8" screw through the Grounding hole, rear-to-front.
2. Add a spring washer onto the 10-32 5/8" thread, this time front-to rear.
3. Add a nut #10.
4. Add another spring washer.
5. Insert the 6 AWG grounding cable. Connect the other end of the grounding cable to a grounding point at your site.
6. Add another spring washer. Make sure that the grounding cable is tightly secured between the two spring washers.
7. Secure everything with a grounding nut #10.
8. Apply the Ground label under the grounding nut.

9. Apply the Safety Warning label on the side of the chassis, near the grounding stud.

Figure 12: Grid Director 4200 Grounding Stud Installation



6.1.7 Power Requirements

Power requirements are useful for planning the power distribution system needed to support the Grid Director 4200. Heat dissipation is an important consideration for sizing the air-conditioning requirements for an installation. Verify the available power source at the site for the type of device you are installing.

Refer to Power Requirements for Grid Director 4200 power specifications and heat ratings.

CAUTION:

To prevent a loss of input power, verify that the total maximum load on the circuit supplying power to the power supply is within the current ratings of the wiring and breakers.

The Grid Director 4200 requires multiple power connections using standard 3-wire AC power cords including a safety ground. The input voltage is auto adjusting for 100/240 VAC, 50Hz or 60Hz power connection. If you do not use the power cords supplied by Voltaire, the power cords should be rated for 15A or higher.

The Grid Director 4200 includes hot swappable Power Supply Units (sPSU-S) with N:1 or N:N redundancy.

A non-redundant power configuration includes the minimum number of power supplies required by the system for operation.

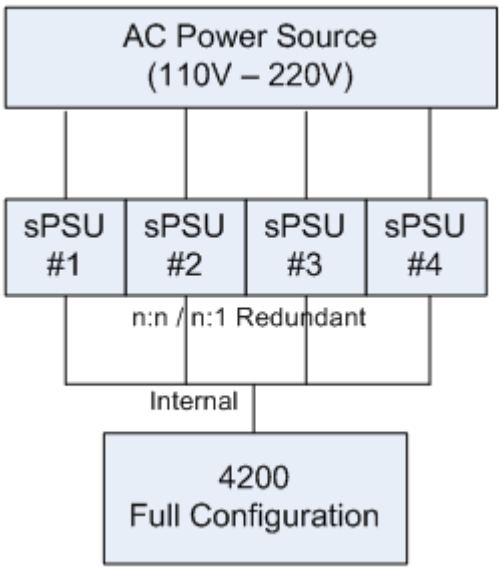
N:N redundancy implies that each non-redundant power supply is fully backed up by a redundant power supply, which is routed to a different power source. This provides for full power backup in case the first power source is disconnected.

N:1 implies that all the system non redundant power supplies are connected to a single power source and are backed up by one spare power supply.

The Grid Director 4200 supports up to four load-sharing 1400W power supplies with separate AC power connections. Each power supply must be powered from separate sockets with circuit breaker 16A for Europe or 20A for North America.

The amount of required power supplies per system is set according to system configuration.

When the Grid Director 4200 is fully configured, it supports N:1 redundancy, as shown in the example below.



Grid Director 4200 Fully Configured - N:1 Redundancy

The tables below illustrate the Grid Director 4200 N:1, N:N, and N:M redundancies.

Table 33: Grid Director 4200 QDR N:1/N:N Redundancy

Configuration	Modules Included	Non-redundant power supplies	N:1	N:N
18 ports QSFP copper	sFB-4200 1 sLB-4018 1 sFU-42H	2	3 (2:1)	4 (2:2)

Configuration	Modules Included	Non-redundant power supplies	N:1	N:N
	1 sFU-42V 1 sMB-CM			
162 ports QSFP copper	4 sFB-4200 9 sLB-4018 1 sFU-42H 1 sFU-42V 1 sMB-CM	2	3 (2:1)	4 (2:2)
162 ports QSFP optic	4 sFB-4200 9 sLB-4018 1 sFU-42H 1 sFU-42V 2 sMB-CM	2	3 (2:1)	4 (2:2)

6.2 Mounting Process Summary

The Grid Director 4200 is mounted in a standard 19" rack with the Fabric Boards facing the front of the rack. The Grid Director 4200 is provided with an adjustable rail kit to accommodate racks of differing depth. The Grid Director 4200 rail kit is adjustable to accommodate a distance of depths of 24" (60 cm) to 40" (100 cm) between the rack's EIA rails.

In addition, the chassis is delivered with cable management (Cabling Guide Brackets).

The mounting process consists of the following steps:

1. Assembling and mounting the Rails
2. Mounting the chassis on the Rail, in a rack.
3. Installing the cable management.

CAUTION:

Due to the weight of the 4200 chassis, at least two people are required to lift and mount it in a rack.

6.3 Assembling and Mounting the Rails

This section shows how to assemble and mount the rails. This section comprises:

1. List of the rail kit and mounting components
2. Overview of the assembling and mounting procedure
3. Assembling and mounting procedure in detail, the steps accompanied by figures, showing the components as they appear aligned and then assembled one by one.

6.3.1 Rail Kit and Mounting Components

The Grid Director 4200 package includes:

- Rail kit
- Mounting Ears (or 19" Brackets) that are factory installed at the front of the chassis

The supplied Rail Kit is adjustable to allow for mounting the chassis in racks of varying depths.

The rail bracket kit includes the following items:

- Left bracket (left Rail)
- Right bracket (right Rail)
- 2 Inserts (with elongated holes) – same for both left and right rails
- 8-32 Screws 5/8" (Qty: 2 x 8)
- 8-32 Screws 3/8" (Qty: 2 x 3) – to be used in case of chassis transportation in a rack.
- 8-32 Nuts (Qty: 2 x 11)
- M4 Flat Washers (Qty: 2 X 11)
- Spring Washers (Qty: 2 x 8)
- Tooth washers (Qty: 2x3)

NOTE:

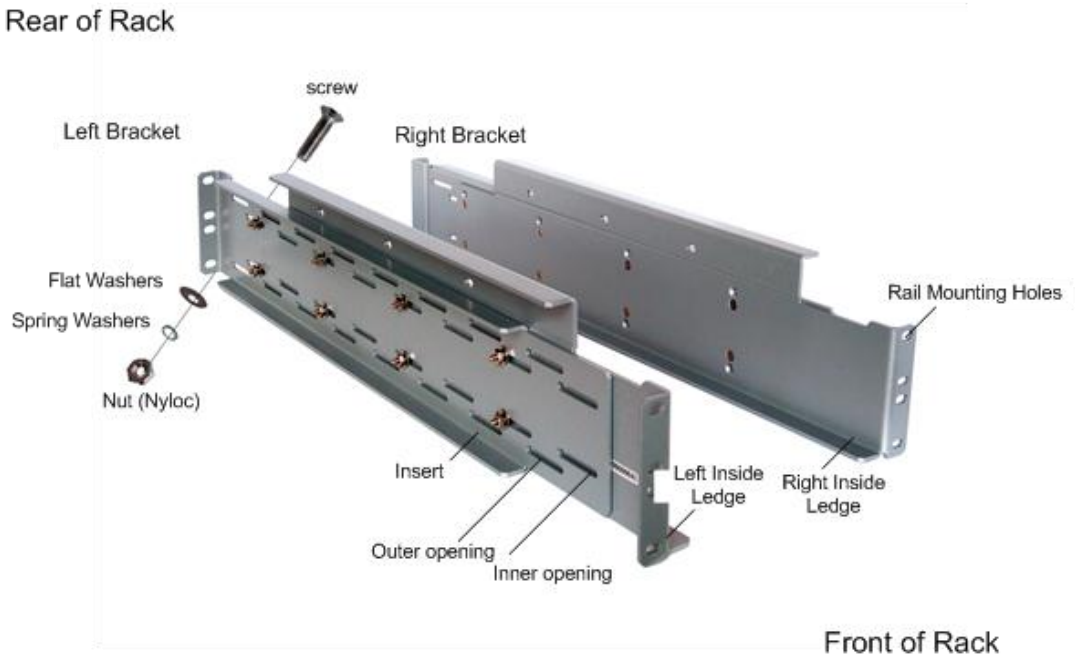
Mellanox does not provide clip nuts.

6.3.2 Rail Kit Assembly Overview

This overview presents the appearance of the assembled rail kit and summarizes the main steps of the procedure for assembling the rail kit. The figure below shows the completed assembly, so that you have a clear image of your objective; the procedure summary is described in the following section.

The following image shows the two rails completely assembled and how the left rail looks when it is attached to the rack.

Figure 13: Overview of Assembled Rail Kit



NOTES:

- Use all 8 screws. Note the order of the nuts and washers.
- Select the inner openings or outer openings (as shown on the photo), depending on the Rack vertical rails locations.
- Inside ledges are used for sliding the chassis along the rail.

6.3.2.1 Procedure Summary

Perform each step of the following procedure for both rails.

1. Use 8-32 5/8" screws and flat washers and spring provided with the kit to assemble the Rail, positioning the insert in front of the bracket.
2. For each rail (left and right), take a bracket and attach an insert (the two inserts are identical). At this stage, position the two parts to fit the distance between the rack rails of each side. Make sure that you are using the right bracket for the right Rail (right side when facing the front of the rack) and the left bracket for the left Rail (left side when facing the front of the rack). The insert is identical for both Rails. The rail supports six or eight 8-32 5/8" screws. Eight is recommended.
3. Select the counter sunk holes in the bracket.
4. Assemble the Rail with flat washers, spring washers, and nuts.
5. Do not tighten the screws at this time.
6. Align the Rail mounting holes with the mounting holes in the equipment rack.

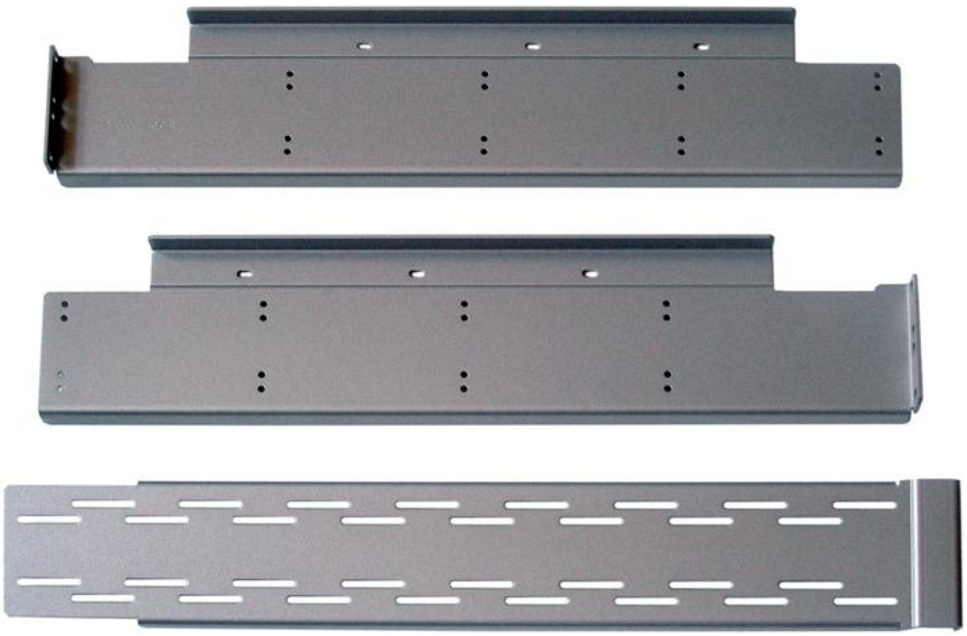
7. Install the rail kit by positioning the rail brackets in alignment with the adequate mark on the Rack.
8. Attach the front side of the Rail to the rack's front vertical side rail with 2 screws for each side and the rear side of the Rail to the rack's rear vertical side rail with 2 screws for each side. If you do not tighten the screws, the chassis cannot be mounted safely in the rack.
9. Repeat all the steps above to assemble the other Rail and mount it on the other side of the chassis; the Rails are now ready for chassis installation.

NOTE:

When mounting the rail ensure box-to-box vertical alignment on all four rack rails. See that the bottom side of the rail is aligned with the 1U marking on the rack rail.

6.3.3 Rail Kit Assembling Procedure in Detail

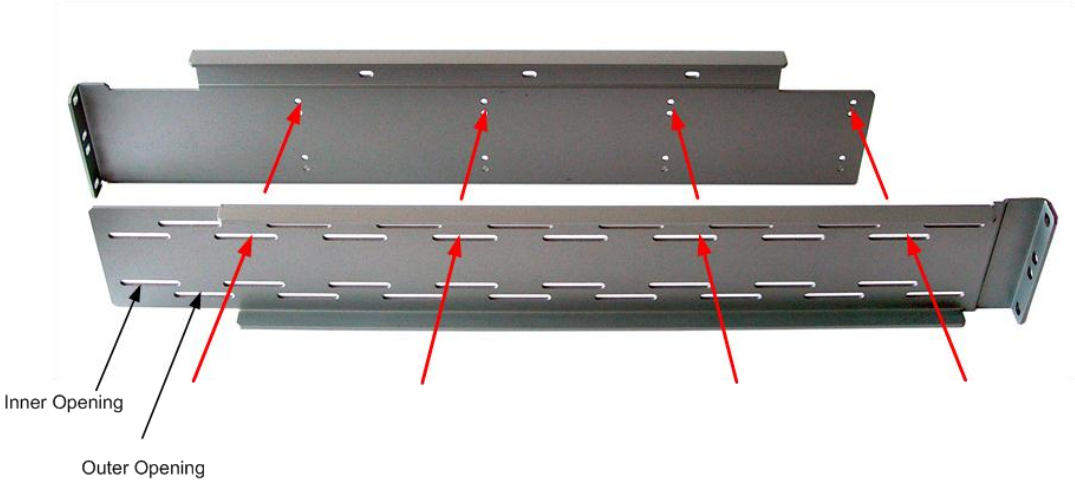
This section presents the detailed procedure for assembling and mounting the rail kit. Each step is accompanied by a figure, showing the components as they appear being aligned and then assembled one by one.

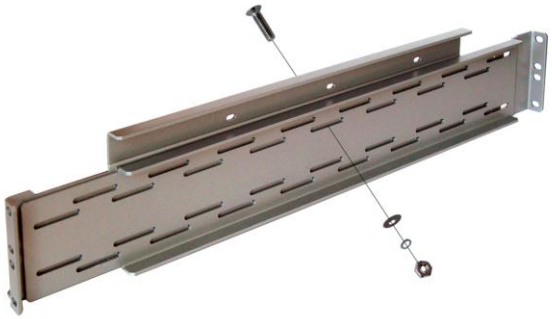


In addition, eight screw sets are included, comprising one screw, one nut, and two washers.

➢ ***To assemble the Rail:***

1. Use 8-32 5/8" screws and flat washers and spring provided with the kit to assemble the Rail, positioning the insert in front of the bracket as displayed in the figures below.
2. For each of left and right, take a bracket and attach an insert (the two inserts are identical). At this stage, position the two parts to fit the distance between the rack rails of each side. Make sure that you are using the right bracket for the right Rail (right side when facing the front of the rack) and the left bracket for the left Rail (left side when facing the front of the rack). The insert is identical for both Rails. The rail supports six or eight 8-32 5/8" screws. Eight is recommended.

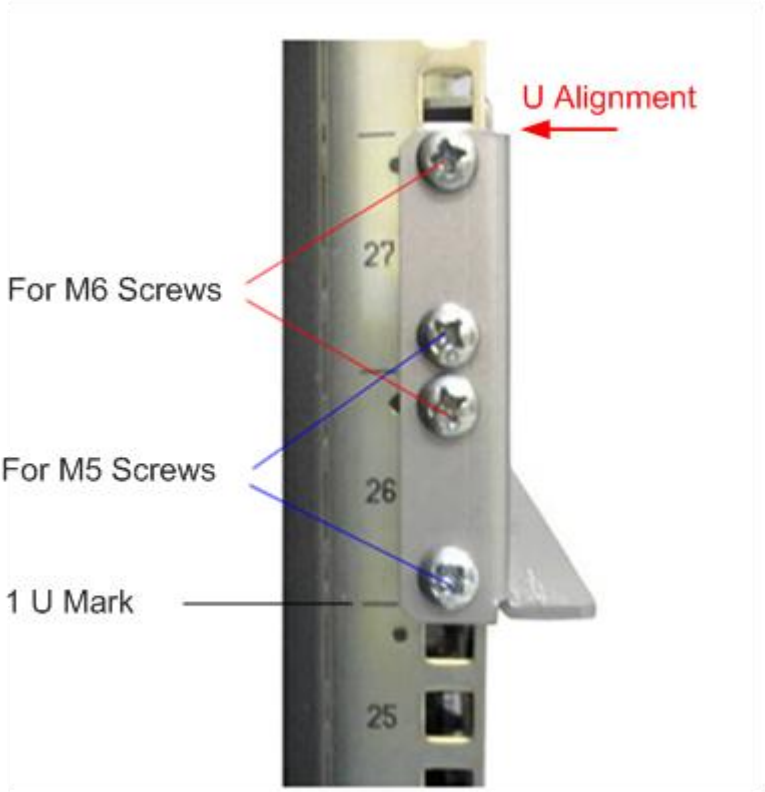




3. Select the round holes in the bracket and assemble the Rail with flat washers, spring washers, and nuts. Do not tighten the screws at this time.

4. Align the Rail mounting holes with the mounting holes in the equipment rack.
5. Install the rail kit by positioning Position the Rail Brackets in alignment with the 1U mark on the Rack.

Note: you can install any equipment adjacent to the Rail Kit as long as you align the Rail kit with the "U" mark.



6. Attach the front side of the Rail to the rack's front vertical side rail with 2 screws and the rear side of the Rail to the rack's rear vertical side rail with 2 screws.
7. Go back and tighten the screws that were used to connect the two parts of the Rail in Step 1. If you do not tighten the screws, the chassis cannot be mounted safely in the rack.
8. Repeat all the steps above to assemble the other Rail and mount it on the other side of the chassis; the Rails are now ready for chassis installation.

NOTE:

Ensure box-to-box vertical alignment in all four connections. See that the bottom side of the rail is aligned with the 1U marking on the rack rail.

6.4 Mounting the Grid Director 4200 in a Rack

This section provides instructions on how to mount the Grid Director 4200 in a rack.

NOTE:

Screws and Clip nuts to connect the Chassis to the Rack and Rail kit to Rack are not supplied by Mellanox.

CAUTION:

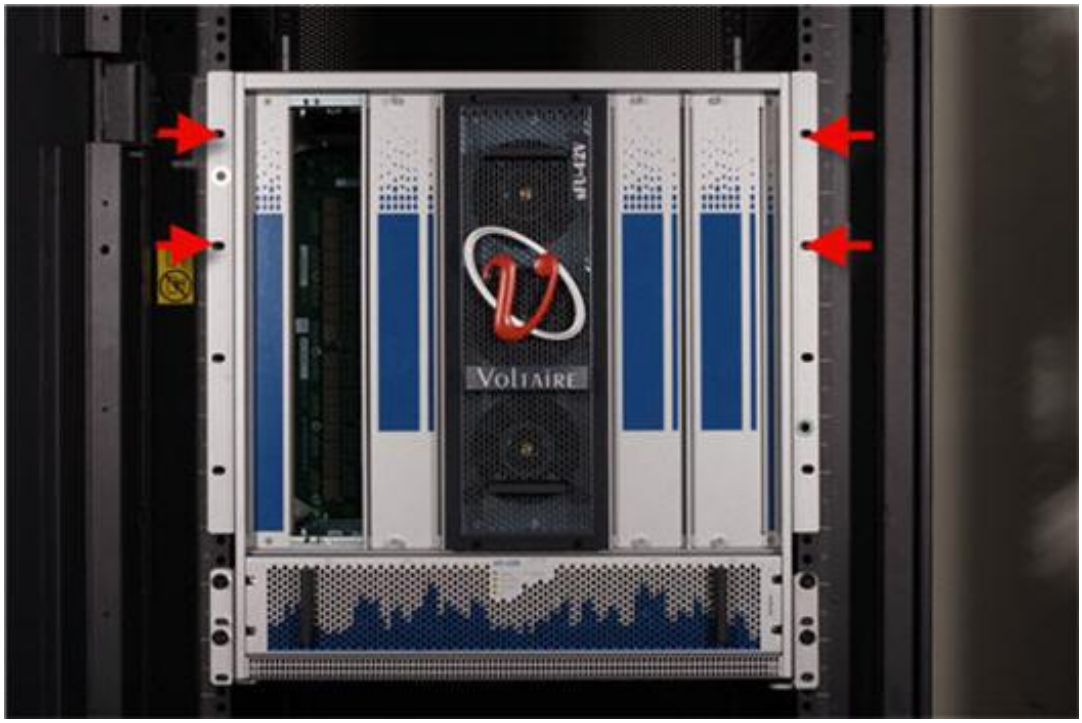
Make sure that the grounding stud is installed before performing the steps below.

Prerequisites:

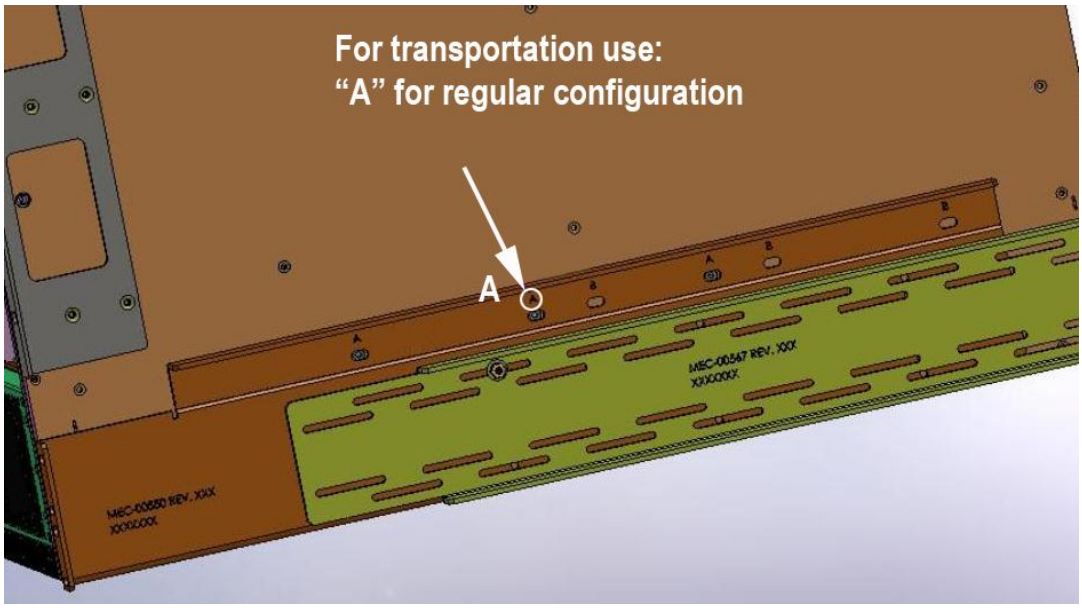
- Rail kit
- 19" bracket attached to the chassis

➢ ***To install the Grid Director 4200:***

1. Lift the chassis using a hydraulic chassis lift (or another adequate tool) and place it on the Rails, with the front of the chassis towards you, as shown in the figure below.
2. Slide the chassis into place. **Note:** At least two people are required to perform this operation.
3. Secure the chassis onto the rack by aligning the holes in the front of the chassis with the mounting holes in the equipment rack's vertical front rail.
4. Secure the chassis through the holes in the Front Rack Rail using 8 screws (4 for each side) and adequate clip nuts.



5. To stabilize the chassis for transport, secure the 4200 chassis onto the Rail by using three 8-32 screws, 3/8" tooth washers, and flat washers, insert them into the oval holes and the threaded holes in the chassis side walls. Once the rack is installed on the premises, these screws should be taken away to allow chassis removal in case the sides of the rack are not accessible.



7 Installing System Boards

7.1 Chassis Board Configuration

Boards must be installed in their designated slot to enable their full functionality. All boards are hot swappable and therefore can be inserted and extracted without turning off electrical power on the Grid Director 4200.

The Grid Director 4200 is factory pre-assembled with fan units. Additional boards and modules are shipped according to the system configuration and are added during installation. Refer to System Configurations (on page 21) for a list of the possible chassis configurations.

NOTE:

Every slot that is not populated with a module must be covered with a blank panel for proper cooling.

7.1.1 Grid Director 4200

The front panel of a Grid Director 4200 includes:

- Four slots for Fabric Boards (sFB)
- sFU-42H Horizontal Fan Unit
- sFU-42V Vertical Fan Unit

The rear panel of a Grid Director 4200 includes:

- 9 slots which can be filled with Line Boards
- 2 slots for Management boards (sMB)
- 4 bays for power supply modules (The power supplies can be installed in any of the bays, without restriction)

7.2 Inserting/Extracting Boards

CAUTION:

When handling electronic boards, wear grounding wrist straps to avoid ESD damage to the card. Do not directly touch the Midplane with your hand or any metal tool, or you could shock yourself.

Fabric Boards, Management Boards, and Line Boards have ejectors that lock the board in place and serve as levers for seating or extracting.

- The ejectors snap inward to lock the board in place.
- Two screws on each board complete the seating and lock of the board in place.

The following figures illustrate the module insertion procedure and the ejectors action. This procedure is applicable to modules with ejectors, namely Line Boards (sLB), Fabric Boards (sFB), and Management Boards (sMB).

1. Slide the module into the slot.

2. Using your thumbs, push the module in until the ejectors start moving in.

3. Push the ejectors until they lock.

4. Use a screwdriver to secure module in place.

NOTE:

The ejector mechanism on the Management Board (sMB-CM) is identical to the one used on the Line and Fabric boards.

TIPS:

It is recommended to tighten the two board screws before starting to operate the system Refer to Torque Settings for specifications.

When inserting the screws, make sure that they are inserted directly into their groove and that they slide in easily. It is recommended to start the insertion manually to ensure that the insertion is correct.

CAUTION:

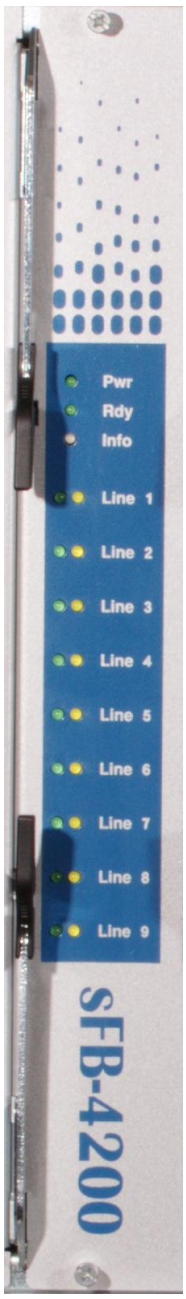
When using an electric screwdriver to fasten the board screws in place, do not use more than Torque 3 force as this could damage the screws.

7.3 Installing Fabric Boards

The Grid Director 4200 supports up to four (4) swappable Fabric Boards (Fabric) that determine the total bandwidth of the switching CLOS topology within the chassis.

You can install up to nine Fabric Boards at the front of the Grid Director 4200 chassis to achieve a fully non-blocking system.

Figure 14: sFB-4200



Refer to LED Indications for a comprehensive list of LEDs, LED description, and functionality.

➢ ***To insert a Fabric Board into the chassis:***

1. Verify that the ejectors are fully open.
2. Carefully seat the board into the side guide rails.
   - Slowly slide the board into the chassis until the module guide pins engage the chassis.

- The ejectors begin to engage the chassis and start moving.
- When sliding in the board, push from the center of the board front panel and not by pushing the ejectors.
- Make sure that the front panel of the Fabric Board is vertical and pushed all the way up to the front panel of the chassis.

3. Gently press the ejectors inward.
4. Tighten the two security screws.
5. Verify the following LED conditions:
   - Power LED: ON
   - Info LED: OFF
   - Rdy LED: Starts to blink slowly

> **CAUTION:**
>
> Use caution when inserting Fabric Boards; gently lock ejectors in place.

➢ ***To extract a Fabric Board from the chassis:***

1. Release the security screws.
2. Pull the ejectors outwards and slowly slide out the board.

7.4 Installing the Line Board (sLB-4018)

The Grid Director 4200 supports up to nine (9) Line Boards. Each line card contains 18 4X QDR InfiniBand ports for connectivity between the outside world and the Switch fabrics.

You can install up to 9 Line Boards (sLB-4018) at the rear of the Grid Director 4200.

The sLB-2018 hosts 18 external QSFP ports and 18 internal ports on each sLB-4018.

The InfiniBand ports are numbered from 1-18 (from left to right).

The following figure shows the front panel of the sLB-4018 Line Board.

Figure 15: Line Board (sLB-4018)

> **TIP:**
>
> When installing the Line Boards, start at the bottom of the chassis and work your way up.

➢ ***To insert a Line Board into the chassis:***

1. Carefully seat the board into the side guide rails. Slowly slide the board into the chassis until the ejectors begin to engage on the chassis edge. Do not exert excess force on the connectors when inserting the Line Board.

2. Push the ejectors inwards.
3. Tighten the two security screws.
4. Verify the following LED conditions:
   - Power LED: ON
   - Info LED: OFF
   - Rdy LED: Starts to blink slowly

➢ ***To extract a Line Board from the chassis:***

1. Disconnect all cables.
2. Release the security screws.
3. Pull the ejectors outwards and slowly slide the board out.

7.5 Installing the Management Board (sMB-CM)

The Grid Director 4200 supports redundant High-Memory Management Boards (sMBs). The master sMB-CM serves as the active system manager while the other is a standby management board. The latter takes control when it detects a failure of the active sMB. Failure can be caused by the Subnet Manager, or removal or failure of sMB. The redundancy mechanism maintains consistent replications of the system configuration parameters on both sMB modules.

You can either install one or two sMB in the back of the Grid Director 4200.

The front panel of the Management Board is shown in the following figure.

Figure 16: sMB Management Board

The Management Board provides one RS-232 port and one Ethernet port for management capabilities.

Each Grid Director 4200 can be populated with one or two sMB-CM Management Boards. At a given time, only one sMB-CM Management Board is operating as a master (active) while the other board is in standby mode (passive).

Refer to LED Indications for a comprehensive list of LEDs, LED description and functionality.

➢ ***To insert a Management Board into the chassis:***

1. Pull the ejector to a fully open position.
2. Carefully seat the board into the side guide rails. Slowly slide the board into the chassis until the module guide engage the chassis, then the ejectors begin to engage on the chassis edge.
3. Push the ejector inwards.

4. Tighten the two security screws.
5. Verify the following LED conditions:
   - Power LED: ON
   - Info LED: OFF

➢ ***To extract a Management Board from the chassis:***

1. Disconnect all cables from the specific board.
2. Release the security screws.
3. Pull the ejector outwards and slowly slide the board out.

7.6 Installing the Power Supply Unit (sPSU-S)

Power Supply modules are installed in the rear of the Grid Director 4200. Ideally, you should connect each Power Supply module line cord to a different circuit for maximum fault tolerance in the event of power problems.

Please refer to the Regulatory and Compliance Reference Guide (for Safety) listed in the Related Documentation before connecting the power supplies to mains.

The front panel of the Power Supply module is shown in the following figure.

Figure 17: Power Supply Unit (sPSU-S)

Refer to LED Indications for a comprehensive list of LEDs, LED description and functionality.

➢ ***To insert a Power Supply into the chassis:***

1. Carefully seat the unit into the designated slot. Slowly slide the unit into the chassis until the unit is completely engaged on the chassis edge.
2. Tighten the screws.

IMPORTANT:

Please verify that you have the correct number of power supplies installed when powering up the system. Using fewer than the required power supplies for your specific configuration may cause malfunction.

All power supplies must be powered simultaneously. If not powered simultaneously, the system may not start properly.

➢ ***To extract a Power Supply from the chassis:***

1. Disconnect power cable.
2. Loosen the screws.
3. Extract the Power Supply by pulling the handle.

CAUTION:

This product may contain sealed lead acid, nickel cadmium, nickel metal hydride, lithium, or lithium ion battery. The battery must be recycled or disposed of properly. Recycling facilities may not be available in your area. Batteries or packaging for batteries are labeled in accordance with European Directive 2006/66/EC concerning batteries and accumulators and waste batteries and accumulators. The Directive determines the framework for the return and recycling of used batteries and accumulators as applicable throughout the European Union.

For Taiwan:

Please recycle batteries

廢電池請回收

This mark applies only to countries within the European Union (EU)

This label is applied to various batteries to indicate that the battery is not to be thrown away, but rather reclaimed upon end of life per this Directive.

In accordance with the European Directive 2006/66/EC, batteries and accumulators are labeled to indicate that they are to be collected separately and recycled at end of life. The label on the battery may also include a chemical symbol for the metal concerned in the battery (Pb for lead, Hg for mercury and Cd for cadmium). Users of batteries and accumulators must not dispose of batteries and accumulators as unsorted municipal waste, but use the collection framework available to customers for the return, recycling and treatment of batteries and accumulators. Customer participation is important to minimize any potential effects of batteries and accumulators on the environment and human health due to the potential presence of hazardous substances.

7.7 Fan Units (sFUs)

The Grid Director 4200 is pre-assembled at the factory with the Fan Units installed at the front of the chassis.

The Fan Units are hot swappable modules.

At system startup, fan speed is set to turbo mode until adequate temperature is reached. Fan speed is then set to normal mode.

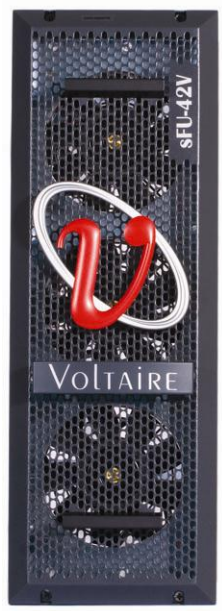
The Grid Director 4200 hosts a Vertical Fan Unit (sFU-42V) and a Horizontal Fan Unit (sFU-42H). When replacing one of the 4200 Fan Units, the other takes over and changes to turbo mode, to ensure proper system ventilation.

The Grid Director 4200 Fan Units can be replaced within five minutes without interruption to the operation of the chassis and without disconnecting it from power.

7.7.1 Vertical Fan Unit (sFU-42V)

The sFU-42V Vertical Fan Unit, shown in the following figure, is part of the Grid Director 4200 air cooling system; it provides cooling of the Line Boards and the Management Boards. It is hot swappable and includes three fans with fan speed control; fan speed is dynamically controlled as a function of temperature.

Figure 18: sFU-42V Vertical Fan Unit Front Panel



CAUTION:

Never remove the sFU-42V and sFU-42H at the same time; at least one fan unit must be installed at all times.

➢ ***To replace the sFU-42V:***

1. Loosen the four screws that secure the sFU-42V to the chassis.
2. Remove the sFU-42V by sliding it out of the chassis.
3. Within five minutes, replace with a new sFU-42V and place and tighten the four screws.
4. Listen for proper sFU-42V fan operation.

7.7.2 Horizontal Fan Unit (sFU-42H)

The sFU-42H Horizontal Fan Unit, shown in the following figure is part of the Grid Director 4200 air cooling system; it provides cooling of the Fabric Boards. It is hot-swappable and

includes eight fans with fan speed control; fan speed is dynamically controlled as a function of temperature.

LED indications provide an onsite report on the operating conditions of the air cooling system modules, and provide an alarm indicator in the event of a high temperature condition.

Figure 19: sFU-42H Horizontal Fan Unit

Refer to LED Indications for a comprehensive list of LEDs, LED description and functionality.

- ***To replace the sFU-42H Horizontal Fan Unit:***

1. Loosen the four screws that secure the sFU-42H Horizontal Fan Unit to the chassis.
2. Remove the sFU-42H Horizontal Fan Unit by sliding it out of the chassis.
3. Replace with a new sFU-42H Horizontal Fan Unit and tighten the four screws (within five minutes).
4. Listen for proper fan operation and check the LEDs.

8 Cable Management

8.1 Cable Management Overview

The Grid Director 4200 Cabling Guide Brackets are installed at the rear of the rack, in-line with the Line Boards and are designed to accommodate adequate cable bend radius.

The Cabling Guide brackets are part of the basic chassis configuration.

NOTE:

Selecting the optimal InfiniBand cable length depends on the overall cluster configuration and requires proper planning to produce orderly and maintainable cabling.

RECOMMENDATIONS:

The Grid Director 4200 space in the Rack should be free from obstructions such as power strips.

The rack mounted Cabling Guide Bracket should be installed with its bend facing out, otherwise it will prevent Line Boards from being inserted or removed.

Make sure that the rack rails that overlap with the 11U of the Grid Director 4200 are free of PDU and power inlets.

The Grid Director 4200 Cabling Guide Brackets are illustrated in the following section.

8.2 Installing the Cable Management

The following figure shows the Cable Management.

Figure 20: Cabling Guide Brackets (left and right)

Left and Right brackets are marked "L" for left and "R" for right. When installed, make sure that the grips face out.

- ***To Install Rack Gripping Cabling Guide Brackets:***

The Rack Gripping Brackets are installed on the rack's rear rail, as follows:

1. Install the Cabling Guide Brackets at the rear of the rack itself, on the rail, and not on the Grid Director 4200. It is not important from the Cable Management perspective where the Grid Director 4200 is installed in the rack.
2. Install the Cabling Guide Brackets in parallel with the Grid Director 4200 so that each Line Board lines up with its corresponding hanger on the Bracket.

- ***To connect an InfiniBand cable to an sLB-4018 Line Board:***

1. Route the cable to the nearest Cabling Guide bracket hanger position.
2. Position the InfiniBand cable connector with the pulling tab at top, and push the connector in place.
3. Verify that the cable is inserted properly into the connector by gently tugging the cable; verify that the Link State green-colored LED lights (and does not flash) indicating a good physical connection.
4. Gently fasten in place with Velcro tie or tie wraps.

CAUTION:

Avoid using tie wrap guns or similar tools; do not fasten the InfiniBand cable too tightly, as this may cause irreversible damage to the cables.

Tie wraps and zip ties can damage the cables. Velcro tie is the recommended option.

Do not bend the InfiniBand cables too sharply. The recommended minimum bend radius is 4" (10 cm).

The following figure shows the Grid Director 4200 cable dressing:

Figure 21: Grid Director 4200 Cable Dressing

8.3 InfiniBand Cabling Guidelines

It is recommended to dress the cables connected to the InfiniBand connectors of each sLB into two groups, left and right, and fasten them down gently after connectivity has been verified.

The cables from the same half of the Line Boards are bundled on the corresponding hangers and will be routed down along the Rack side wall.

Cables should be arranged so that each Line board's cables don't interfere with the neighbor Line Board insertion or removal.

8.3.1 InfiniBand Cabling—Do's and Don'ts

Do not kink the cable.

Do not over-bend the cable behind the connector.

Do not twist the connector.

If it is necessary to re-orient the connector, start the adjustment further down the cable, at least 75 cm away from the connector, so the twist occurs gradually along the cable instead of abruptly near the connector.

8.4 Replacing Line Boards

If the cabling is done according to the guidelines described in the InfiniBand Cabling guidelines above.

You can replace sLB-4018 without interfering with traffic or operation of adjacent Line Boards, even when the Grid Director 4200 is fully populated with Line Boards.

You can connect and disconnect InfiniBand cables while the Grid Director 4200 is powered on.

- ***To replace a Line Board:***

1. Carefully remove the InfiniBand cable connections from the Line Board connectors (located at the rear side of the chassis). It is recommended to gently secure the removed cables using a Velcro tie, neatly placing the cables on the outside of cable guide bracket rails.
2. Remove a Line Board.
3. Insert a new Line Board.
4. Replace the cable connections.

8.5 Connecting to the Management Ports

The Grid Director 4200 has management ports located at top back of the chassis. This includes two interfaces: a serial interface for local console access and a 10/100/1G Ethernet interface for network access. The serial port can be used to connect to a PC running terminal emulation software for Grid Director 4200 management tasks. The Ethernet port is connected to an IP network and is used to run a CLI (via Telnet).

It also includes a USB type A connection (One USB 2.0 Host interface allows you to increase the CPU flash memory by a connection to a standard Disk-On-Key device.).

Through the management network, you can manage the Grid Director 4200 using a Command Line Interface (CLI). Refer to the relevant User Manual for more information.

If the configuration calls for out-of-band management of the Grid Director 4200, either using a serial connection or over Ethernet, the management network must be connected to the corresponding management ports on the rear of the Chassis. Both types of management network can be connected simultaneously.

- ***To connect to the Management port Ethernet Interface:***

1. Connect the end of the management cable with the single RJ45 connector to the Management port on the Grid Director 4200.
2. Connect the end of the cable with Ethernet connector to the appropriate devices/network.

- ***To connect to the Management port Serial Interface:***

1. Connect the end of the management cable with the single RJ45 connector to the Management port on the Grid Director 4200.

2. Connect the end of the cable with the DB9 serial connector to a PC or a console. The PC/console must support VT100 terminal emulation and should be equipped with terminal emulation software such as HyperTerminal or ProComm Plus.
3. Make sure that your PC/console terminal emulation software is configured to communicate with the Grid Director 4200 via hardware flow control. Configure the baud rate and character format of the PC terminal emulation program to match these RS-232 management port default characteristics:
   - 38,400 baud
   - Eight data bits
   - One stop bit
   - No parity
   - Flow Control – None

9 Operation

9.1 Operation Overview

Once the Grid Director 4200 and the boards are installed is secure within the rack, set up the electrical cables from the power distribution source in preparation for connection.

Power cords are supplied by Voltaire according to the system configuration, one per power supply unit.

NOTE:

Verify that you have the correct number of power supply modules installed.

9.2 Powering the Grid Director 4200

➢ ***To start up the Grid Director 4200:***

1. Ensure that all site power and grounding requirements have been met before connecting the chassis to a power source.
2. Before turning on the power, verify that all boards, power supplies, and fan tray modules are properly inserted.
3. Connect the power supply cords to the AC connectors located at the rear of the chassis.

All LED indicators on the Fabric Board and Line Board briefly light up and then turn off just after power is turned on.

This is a normal part of the power on initialization sequence. After initialization is completed, the link LED indicators on the Fabric Board and Line Board are in a state representing the link status of their corresponding ports.

If you don't install enough sPSUs, the system will not be able to power up. In some cases, only part of the system may power up and other parts will remain unpowered.

Determine the minimum number of PSU required and to add at least 1 PSU
as redundant (N:1) or full redundant (N:N), as follows:

- Verify that the 4200 chassis is secure within the rack.
- Verify that the InfiniBand cables are plugged into the rear ports.
- Verify that the AC electrical mains outlet(s) is available to connect the 4700 AC cable(s).

CAUTION:

Ensure that all site power requirements have been met before connecting the chassis to the power source.

NOTE:

Line cords should be connected to separate AC circuits for maximum fault tolerance in the event of power problems.

NOTE:

For more details regarding the unit's indicators, refer to LED Indications.

9.3 Verifying Installation

Verifying installation of the Grid Director 4200 consists of making sure that it starts up properly and that the network connections are operational.

9.3.1 Verifying Start-up Operations

➢ ***To verify that the Grid Director 4200 starts up properly:***

1. Observe the Power Supply LEDs on the Fans module front panel to make sure the power supplies are operable.
2. Listen and check for airflow to make sure the fan assembly is operating.
3. Observe system LEDs to verify that the system is running and operational.

9.3.2 Verifying Network Connections

Verifying the network connections consists of making sure that the following network ports are operational:

- InfiniBand
- 10/100/1G Ethernet management.

9.4 Where to Go Next

Once you have verified that the Grid Director 4200 hardware is properly installed, it is ready for optional system configuration.

To configure the system software, refer to *Grid Director 4000 Family User Manual*.

10 Troubleshooting

10.1 Solving Operation Problems

When a startup problem is encountered, it is usually attributed to a single component, which is more difficult to isolate than a problem to a subsystem.

When troubleshooting, it is suggested that you start by troubleshooting each separate subsystem in the Grid Director 4200, since there are fewer subsystems than components.

The Grid Director 4200 consists of the following subsystems:

- Power supplies that operate whenever system power is connected
- Chassis fan units which operate when the system power is connected. The fan units will not continue to operate when power is disconnected
- Management Board (CLI/Eth)
- Line Board (sLB-4018)
- Fabric Boards (sFB-4200)

The following are simple checks you can make to determine if there is a fan problem:

- Listen to the fan units to determine they are operating
- Check for any obstructions restricting airflow through the Grid Director 4200

If you determine that the fan is not operating, contact a customer service representative.

10.2 Identifying Startup Problems

Perform the following steps when you connect the power cord to the Grid Director 4200:

1. Listen for the chassis fans operation. If they do not operate, the fans may need to be replaced. Continue to Step 2 to determine if the Power Supplies are operational. If you determine that the power supplies are functioning normally and that the fans are faulty, contact a customer service representative. If the Grid Director 4200 fan does not function properly at initial startup (there are no installation adjustments that you can make), contact a customer service representative.
2. Check the Power Supply LEDs on the rear panel. The Power LEDs illuminate immediately upon the connection of power to the Grid Director 4200. If the LEDs are not on, the power supplies may need to be replaced.
3. Check the Link LEDs on the Line Boards front panel for the various ports. In the event of a system lock-up in the Grid Director 4200, the reset button can be used to reset and reboot the system. The system has two Reset buttons: one is located on the front panel of the sFU-42H Horizontal Fan Unit, and one on the sMB-CM Management Board panel. To reset the switch, push the button using a thick wire or tip of a pen until the system reboots. Remove the wire or pen immediately afterwards.

4. Verify that the PC terminal emulation program is set correctly and that the PC is connected properly to the Console management port if the boot information and CLI prompt are not displayed.

10.3 Contacting Customer Service

If you are unable to solve a startup problem after using the troubleshooting suggestions in this chapter, contact a customer service representative for assistance and further instructions. Before you call, have the following information ready to help your service representative assist you as quickly as possible:

- The date that you received the Grid Director 4200 and modules
- The chassis serial number
- The type of software and release number
- The maintenance agreement or warranty information
- A brief description of the problem
- A brief explanation of the steps you have already taken to isolate and resolve the problem

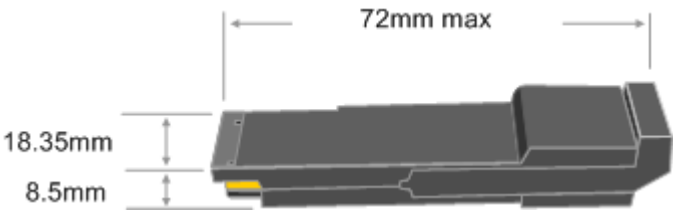
11 Cabling Information and Specifications

This appendix provides the QSFP cable specifications and the 1 GbE port pinouts.

11.1 QSFP Cable Key Features

- Small size, high density, hot-pluggable connector with four transmit and four receive channels
- Supports both types of cables:
  - Copper active or passive cable
    - Copper passive cable equipped with two simple passive connectors and a standard copper cable
    - Copper active cable equipped with an active device to optimize signal quality
  - Fibre optic cable delivered as either:
    - Fibre cable with two separate modules
    - Active optic cable where cable and optic adaptors are delivered as a single unit (permanently attached cable)
- Data rate: 2.5 Gbps (SDR), 5 Gbps (DDR), and up to 10 Gbps (QDR) per channel
- QSFP (Quad Small Form-factor Pluggable) optic modules use standard MPO parallel 12-fibre jacketed ribbon optical connector
- Provide manageability, discovery, and identification capability, such as vendor identification, module part number, serial number, cable type, using low-speed two-wire (I2C) interface
- Active cables: Integrates digital diagnostic capability to monitor link performance
- Latching mechanism
- Mechanical Dimensions

Figure 22: QSFP Connector-Dimensions



NOTE:

QSFP to CX4 cables are available to connect 4200 equipped with QSFP with legacy DDR/SDR systems equipped with CX4 connectors.

11.2 QSFP Cable Overview

Every 4200 port on the switch is equipped with transmit and receive circuits that can adjust to fit different types of link characteristics and either optical or copper cables.

The QSFP cables transmit and receive up to 10 Gbps per channel (total: up to 40 Gbps per port) over a single active/passive optical or copper cable, Passive copper cables do not consume any additional power while active copper and optic cables consume up to 2.5 Watt.

The following figure shows the QSFP module with Copper or Optical cables. You can install any combination of the three cable types in any of the 36E QSFP cages.

11.3 IB Port Cable Specifications

For information regarding which specific cable vendors/lengths are supported with Mellanox switches, contact Mellanox support.

11.4 1 GbE Ports (Management)

Use modular, RJ-45, straight-through UTP cables to connect the 10/100/1000 Fast Ethernet ports to external switches and routers. Use modular, RJ-45 cross-connect cables to connect to end systems.

Figure 23: Straight-through Cables

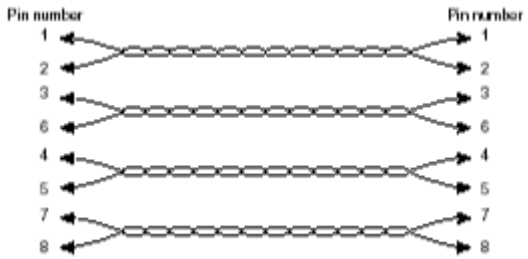
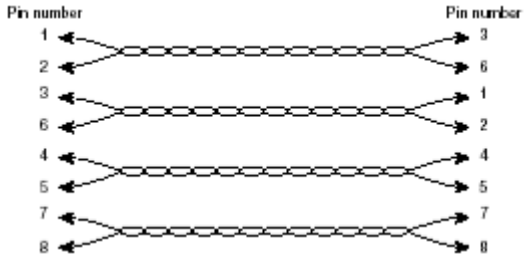


Figure 24: Cross-connect Cables



The 10/100/1000 Fast Ethernet port supports an RJ-45 connector.